# ELECTRICAL REVIEW

[ILLUSTRATED.]

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ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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### Improved Watchman's Clock.

The clock we illustrate herewith is manufactured by the New Haven Clock Company, and has an eight-day movement that is run by weight and pendulum, and is fitted with record dial, with spaces for each day of the week. By this means, one dial will record the visits of the watchman for one week without change. The electrical portion of the clock is extremely simple, there being but one magnet for recording on the dial. This magnet is shifted from one day to another until the last day on the dial is reached, when it is reset by means of a lever, and a new dial put in place of the old one, which is filed away for future reference. The s ation boxes differ from any now in use, in that each visit of the watchman is recorded mechanically in the box itself. There are no dials to replace, but an inspec'ion of the boxes, from time to time, will show whether or not the watchman has faithfully performed his duties. It will be seen at once that it is practically impossible for the watchman to get the best of this clock, without being discovered. They are being placed in many large buildings, mills, factories, etc., in this city and elsewhere, and in every case are giving perfect satisfaction. The new design of street box is also shown herewith.

New Street Box of the New Haven Clock Co.

Improved Watchman's Clock.

Improved Watchman's Clock of the New Haven Clock Co.

### An Unsuccessful Attempt to Victimize Hotel People.

Clerk Stokes, of the Continental Hotel, Philadelphia, received from a Baltimore and Ohio messenger boy, one day last week, a neatly done up pasteboard box purporting to have come by express from Lord & Taylor's establishment in New York, to Mr. Hampton W. Cook, one of the guests of the hotel. It was bound with tape, which was crossed and sealed with red wax, was marked "C. O. D.," and had on it several other marks, ostensibly of express agents, through whose hands it was supposed to have passed. Previously Mr. Stokes had answered an inquiry by telephone for Clerk Anderson, and then for Clerk Dennison, both of whom were off duty at the time, and shortly afterwards his own name was called by some person who gave Mr. Cook's name, and apprised Mr. Stokes that a package would be left for Mr. Cook, who requested him to pay the charges in the absence of the latter from the hotel.

This was agreed to, but when the package came along a few minutes later, the fact that it was delivered by a messenger boy and not by an expressman, that it had so many marks on it, and that the charge was $54 50, for which no bill of goods was presented, excited the suspicions of Mr. Stokes and Mr. Hughes, the cashier. The boy was questioned, and at first said he got the package from the office, but, later, admitted that it was handed him for delivery by a man at Eighth and Sansom streets, who promised to await his return.

The package was opened and found to contain sawdust, paper, and a few pieces of old ribbon. A policeman was called in, who accompanied the boy to the place designated, but when they got there, the man, who had probably been watching the boy, had disappeared.

It is said the same trick, which recently has been played successfully in Cincinnati and other Western cities, was attempted, about the same time, at other leading hotels, but without successful result. As it is believed two or more parties were operating, a general warning was sent out by Chief Wood to hotel men to be on their guard.

### Hughes' Induction Balance.

Writing to *Nature* from the Central College, Bangalore, S India, Mr. J. Cook says: "Having just made a Hughes' induction balance, I have, in the course of some experiments with it, observed what was new to me, for I have not seen it mentioned in any account of the balance. I take the liberty, therefore, of asking through your columns whether the explanation resolves itself into the difference between paramagnetic and diamagnetic substances. The apertures of my bobbins are 1¼ inch in diameter; my primary current is from three Daniell's, and the break is a bent steel spring whose free point just grazes the surface of a mercury cup, so that the merest touch with a finger causes a series of regular breaks. Now, if I place an iron or steel disk, or ring, such as a key-ring, inside the aperture, the telephone sounds loudly if the plane of the disk or ring is at right angles to the plane of the coils; but very faintly if it is parallel to the plane of the coils. On the other hand, if a disk, or ring, or coil of wire, of any of the diamagnetic metals—copper, brass, zinc, silver, gold, aluminum lead—be used, the telephone sounds loudly if the plane of the disk or ring be parallel to the plane of the coils; but very faintly, if at all, when it is perpendicular to the plane of the coils. Further, if a short bar of soft iron, or of nickel be inserted so that the length of the bar is parallel to the plane of the coils, almost no sound is heard; but if it be turned through a right angle so as to be perpendicular to the plane of the coils, the sound is a maximum. Have we in this simple instrument the ready means of distinguishing paramagnetic from diamagnetic substances?"

### Electricity and Crime.

The use of electric signals is proving more and more dangerous to criminals. A system of signals is on experimental trial in New York, in which different colored lights are flashed on the lamp-posts. Such signals will no doubt in the future be fixed so as to enable policemen on their beats to communicate quickly with each other. At present when a policeman gives chase to a robber at night, the chances are always in favor of the robber. If by some system of signals, suggested by call boards, for instance, the pursuer could notify all the patrolmen in the district where he was, and by touching buttons on lamp-posts give them the direction of the chase, the escape of midnight thieves would be less frequent.

## The Electric Light and Railways in Great Britain.

It is gratifying to hear that some advance is being made in the application of the electric light for the illumination of railway passenger trains. There are, we understand, now some seven trains lighted by electricity running on the London, Brighton and South Coast Railway; whilst two trains have been recently fitted, and are now being worked, on the Great Northern. Others are, it is said, in hand for both companies, so that there would appear to be some prospect of, at all events, further and extended trials, the result of which cannot fail, we trust, to promote its ultimate adoption.

That there exists great room for improvement in the lighting of our railway carriages all are agreed. That there also exists a very general opinion that the electric light is that most to be desired for the purpose is equally true; and we feel that we may add to this our opinion that in its proper application those companies which do make use of it will reap a large economy. The cost of oil lighting is known to largely exceed the cost of electric lighting, whilst there exists no possible comparison between the two for lighting purposes.

It is understood that the trains which have been fitted by each of the companies named are being worked upon the Stroudley-Houghton system, that is, that the light is fed by secondary batteries arranged in the guard's van, the batteries being charged by a dynamo, similarly placed, driven from the wheels of the van. Thus the source of the light is in each case located at one point. Experiments in the lighting of railway trains have not, it is true, been very numerous. Still, railway companies have not neglected the subject. The London and Northwestern, the Great Eastern, the London and Southwestern have all had a finger in the pie, yet, strange to say, none have attempted to deal with the subject in a complete and exhaustive manner. In every case the batteries have been arranged together, so that the light throughout the train has been dependent upon its continuity with that point; in fact, the trials have always been confined to trains made up and kept together for the purpose.

We would like to ask, if electricity is to prove our future illuminant for railway carriages, whether it is probable the exigencies of a railway service are likely to be met by any arrangement which does not provide for breaking up the trains without placing the occupants of the carriages so disconnected in darkness. It is clear that the system hitherto pursued makes no provision against this. That it is possible to make such provision we make no question, but that it has not been done is, we believe, the fact. Now if such a system does not, and is not likely to provide for the necessary requirements of the service—and it is clear that railway trains must from time to time throughout their journey be broken up—is it at all probable that those answerable for the safe conduct of the traffic—and by this we mean the safety and comfort of the passengers—will give it that support necessary to secure its adoption? A little light is better than none! and naturally their decision would be in favor of that which may, although in itself not quite satisfactory, be regarded as so far no worse than it has been for some time past.

In dealing with this question, it is useless regarding it otherwise than in its entirety. If electricity is to become of service for the purpose of lighting our railway carriages, its application should be thought out in such a manner as will meet the entire demands of the service. Arrangements must be made such as will admit of every vehicle being uncoupled and again coupled up, with ease and certainty, by those whose duty it is to marshal the trains. Each coach must of necessity carry its own lighting power, so that, when uncoupled for any purpose, it may have within itself lighting power for a given time. These are requirements which we conceive to be most material to success, and without which we have no hesitation in saying any effort which may be made towards the employment of the light for the purpose named will die out without having effected any solid good.

The question is undoubtedly one of magnitude, and it is its magnitude that renders it so desirable that what is being done should be done with a purpose. The experience already gained has been sufficient to show the excellent adaptability of the light for the work required. It now remains to show how it can be made to practically work in with the requirements of the service. To none are these requirements better known than to the electricians of the several large railway companies, and we feel assured that if they apply their knowledge and experience of the subject they can with ease effect what is desired.

To the several railway companies we would say: If you are about to consider and deal with this matter in a practical manner, remember the "brake" question! Do not forget that at the present day provision has to be made for much interchange of stock. If electric lighting is to be adopted, and we have no doubt of it being so at a future, if not at the present date, whatever is done should be done with a common basis; so that these interchanges of stock may be effected without inconvenience. Let us consider the result with one company's stock fitted with 15-volt lamps, another with 50-volt, and so forth, one system equipped with one form of coupling and another with something totally different. All this will be clear to our readers, and it is unnecessary for us to touch further upon it. Our conviction that in this application of the light there exists an enormous field for its employment, and that in its employment the railway companies will ultimately effect large economies, will plead as our excuse for having thus plainly dealt with the subject. That its adoption will come we have not the least doubt—whether it is near at hand or not rests in a great measure with the manner in which it is applied by those who have its management in their hands.—*London Electrical Review.*

## What are the Requirements for a Course in Electrical Engineering at a Technical School?

BY F. R. HUTTON.

Several of the technical schools have recently established courses of study for the degree of Electrical Engineer, and it has been thought that a consideration of the nature and scope of such a course might be found of interest. It is with the intention of opening a discussion on this subject, and presenting one view of the matter, that the following essay has been made.

It has been well said in recent discussions on the training of engineers, that the best education can only furnish the graduate with a kit of *well-sharpened tools*. That is, he should be taught principles and *how to study*, so that he can cope successfully with the variety of problems which will come in the diverse pursuits which the several members of the same graduating class are certain to encounter in their early experience. This is the better, higher and broader ideal of engineering education, as contrasted with the narrower and more material view at the other extreme, that education should not only furnish knowledge, but experience also, so that a graduate fitted for one special grade of labor can at once become an earner in that field. The difficulty, of course, with this latter plan, is that many men on entrance into school, have not become differentiated or specialized enough for them to decide upon which side of the dividing hedges in the field of engineering their future special work will lie. This is also very often a matter decided by the niches which are found or made for the graduate after his course is finished—found for him by his professors by selection; made for him by influences which he has been able to command. Hence, in discussing the requirements and training in a course of electrical engineering, it will be viewed from the broader basis with which the genius of Columbia College agrees, rather than through the narrower and more rectilineal lens which opens from the operative side of industry.

The course of study in any branch of engineering should make its graduate competent to become a leader in that work which he has to do. What, then, has the electrical engineer to do? What lines are open to him? The thesis which this paper seeks to establish is that the commercial field of the physicist-electrician *by itself* is very limited, and that except as combined with other specialties, cannot usually support its devotee. It is the view of the writer that the electrical engineer will be successful and a leader, in proportion to his excellence and competency as a mechanical engineer, and that electrical engineering as a course should be built up upon mechanical engineering as its basis.

In establishing this position, the question must be propounded—What do we seek from our electrical engineer? The comprehensive reply is that we want from him an expert's counsel as to the ways of utilizing commercially and practically the supplies of available force which are manifested in electric energy. We recognize this energy as furnished by a beneficent Creator for the comfort and uplifting of his creatures, and the electrical engineer is to add to the sum of human happiness in so far as these reservoirs can be made to do industrial work at costs so low as to benefit even the poorest. Would not the mechanical engineer say in parallel terms, that his function was to bring *all* forces provided for man, so that tireless arms of steel may release the tired arms of human workers from toil, and so help every one to raise himself to a higher plane of life? Electric energy is but *one* of the many forces which the mechanical engineer should be competent to direct. The electrical engineer should, therefore, be first a mechanical engineer; and this is even more obvious if the less applied term of dynamic engineer be given to what is more generally known as the mechanical engineer.

Again, as we observe those who are called electrical engineers at this day, what do we find them doing? Their work can be first divided broadly into the generation of electric currents, their transmission to the point where needed, and their industrial utilization at those points. The problems of the storage of electricity belong to the class of transmission problems, where the electromotor supplies energy which is given off at a distant point (distant either in space or time), and is paralleled by the use of compressed air or lifted weights in the purely mechanical field. The questions of pure transmission by wire or other conductors are entirely electrical, and make no demand for mechanical attainment. But they are of the simplest type, are easily mastered by persons of limited ability, and are of slight economic moment as compared with those of either generation or utilization of the currents.

It would be idle to waste space in proving that at this day the electrician who seeks to do industrial work leans hard upon the mechanical engineer for generating his currents. While battery currents will always be of importance for special cases, the armature of the dynamo must be set revolving by the skill of the mechanical man who has installed the motor driven by steam or water until thermal batteries have been devised, by which the oxidation of carbon shall produce the intenser currents directly, or until the atmospheric supplies can be tapped by our skill. In central station work of electric lighting systems, mechanical skill of the highest order is called for to meet the questions of economical generation of steam and transmission of power. Again, in the third place, the industrial utilization of electric force transmitted from the motor, is obviously the department of an engineer, and (with the possible exception of electric lighting) of the mechanical type of an engineer. After all, in the present state of the art, the application of electricity to power commercially is the result of its capacities for easy transmission over long distances, its cleanliness, and its controllability at the point of consumption. In so far, therefore, as respects the motion which results where the electric energy is converted back, it might as well result from the motion of a belt, and the design would be of course in the domain of the engineer and mechanic. It appears, then, that were it not for the dynamo and motor with their connections, as two very important factors in the industrial train, the matter would be solely mechanical. It is these two matters which give the adjective "electrical" its significance in the degree and course of study, and these obviously are not the only ones of concern.

But, again, approaching the question from a third side, and carrying our inquiry into greater detail, in what capacities are electrical engineers engaged in their work? What positions do they fill? In the first place, they are inventors and patentees of electrical specialties. Supported by their own or others' money, they are engaged in laboratories in investigation and research, which result in favored cases in the discovery of new properties of materials, or of new combinations of commercial value. There are and must be but few of these who are successful, and their number must grow less as time goes on. The names of those who belong to this pecuniarily successful class can be counted on the fingers. Edison, Bell and Weston are types of such, but the necessary capacity for such work as they have done is not given to the average man. They may therefore be put on one side from the present discussion. The second class of electrical engineers include those who are manufacturers of their own or of others' patented inventions and specialties. As manufacturers and organizers of labor, as designers of special machinery and superintendents of their operation, they are obviously called upon to show mechanical skill, and their success will depend on the grade of this which they can show. The wealthy among the manufacturers are the capitalists, and their success is due to their business capacity, and not to their scientific acquirements alone. It is in such companies as these that young engineers will try to begin their professional career. As physicists there will be a demand for a few only; as engineers and men of mechanical resource, there will always be room for them in the front seats. Such employes of companies constitute a third type of electrical engineers. They are superintendents of erection and installation, inspectors and testers of erected work, advisers and estimators on new work, designers of special methods for unusual cases, and do other duties of similar type. By far the larger number of educated young engineers are in positions of this sort, which call for electric skill of a high order, but that skill, to be made available, must be based upon an engineering basis of wide extent, largely mechanical and constructive. For such positions, which are the most available and interesting, the electrical engineers should be also and first mechanical engineers.

There is a fourth and last type of electrical engineers, who are men who figure as experts and consulting engineers, doing an office practice largely. To this class belong also the patent experts and solicitors in electrical matters. Such men are usually physicists and men well grounded in theory, but are not often called upon to advise in constructive matters as engineers. The constructing companies have their own engineers and patent lawyers (which requires the legal training to be superadded); and the giving of expert testimony, while very profitable when in full swing, is not engineering in its highest sense. As in the first class of men, there will be but a limited number of detached consulting electrical engineers in the true sense, and they will be such only as have had long and successful experience in some of the other classes. A young graduate and novice would be likely to starve who began in this way by himself.

It would appear, therefore, that a course in electrical engineering should address itself particularly to the training of young men for positions in the second and third groups enumerated. This being conceded, it follows that they should be trained first as mechanical engineers, and upon that foundation

erect the special electric structure. Let them be "mechanical engineers with an electrical engineering attachment," to quote from a sentence used by the writer in an informal conversation on this subject.

If the proposition of this paper be regarded as established, several practical consequences follow. These pages are not the platform for their full presentation, but among them those interested may give thought to the logical embarrassment occasioned where a course in electrical engineering is created before the establishment of a fundamental course in mechanical engineering upon which it can be based; to the dependent relation of the instruction in electrical engineering upon the department of engineering in its broad sense; and to the necessary pre-existence of the mechanical laboratory for the satisfactory training of the electrical engineers. Or, finally (and this is the question to which the whole discussion has been intended to lead), would not the end be best subserved by making the course and degree of mechanical engineer in the university cover so much of electrical knowledge in addition to its other requirements as would render its graduates competent for the electrical positions which they are likely to be called to fill? This would make the mechanical course unique in scope and breadth, would make it attract the best, and would result in its exacting so high a standard in applicants for it as to make its graduates its best recommendation and advertisement.

### Improvements in Batteries.

In batteries employing two liquids, it is of much importance to keep them separate, and hitherto this has been only imperfectly done. Again, in a single fluid battery, where the depolarizer is a powder, it is very difficult to prevent the contact of this latter with the positive electrode.

MM. Dun, Montanus and Hasslacher have nevertheless succeeded by solidifying or gelatinizing one of the liquids. This preparation is not a bad conductor, and above all is not liquid, which is important in batteries where the depolarizer is a soluble metallic compound, as, for example, where the electrodes are composed, one of zinc, the other of lead or copper, the depolarizer being sulphate of copper.

Such an element can be thus mounted: On the bottom of a glass vessel a plate of zinc rolled into a cylinder or spiral is placed, to which a conductor insulated with gutta percha is attached. By adding starch to caustic soda, a gelatinous mass is obtained, which is first liquefied by heat, and then poured into the vessel until its level rises one centimeter above the zinc plate. After cooling, two pieces of wood are placed across the glass vessel, to which the negative electrode is suspended, composed of a perforated plate of lead bent into the shape of a basket, in which crystals of sulphate of copper are placed. When the second conductor is connected to this plate, water has only to be added for the battery to be in working order.—*Revue Scientifique.*

### A New Chronographic Watch.

The Parisian watchmaker, Schwob, has brought out a new chronographic watch (*montre-observateur*) which is a marked improvement on the ordinary stop-watch, says the *Watchmaker and Jeweler*. The face is furnished with a second small dial similar in size to the second's dial. By touching a knob, the hands of this dial, which is a complete copy of the large one, are at once replaced to 12 o'clock, and then continue their progress from that point. This method is very practical, as it not only shows the time of commencing an observation, but infallibly determines its duration without the least trouble, all the observer having to do for this latter purpose being simply to read the time indicated by the small dial, and to subtract that time from the true hour of the large dial. This can all be done without exercising any memory or making any note. We think the invention invaluable for making astronomical or other observations; the eye need not be even turned to the watch in touching the knob, which can be done in perfect darkness. A sleeper is suddenly awakening from a nightmare, or hearing a strange noise at night, and wishing to fix the time of the occurrence, need only press the knob of his watch and turn his head quietly round on his pillow, knowing that in the morning he will have the exact hour and minute correctly registered.

## *OUR KANSAS CITY LETTER.*

(From a special correspondent of the ELECTRICAL REVIEW.)

Mr. W. R. Nelson, proprietor of the Kansas City *Star*, is a devout and enthusiastic believer in electricity. He has a telephone in his business office, one in the editorial room, and a third at his home. He has incandescent lights in the counting room, editorial room, composing room, press room and mailing room. Electric bells connect all the rooms and offices. A special wire and an associated press wire run into the rooms of the telegraph editor. When electricity is able to run his press and heat his establishment, it will be employed for those purposes. The *Times* and *Journal* buildings are also lighted by electricity.

A charter has been granted to the Topeka (Kansas) Belt Railway Company. It has a capital stock of $1,000,000. Its directory includes Messrs. F. R. Cordley and C. L. James, of Massachusetts, and A. Wilder, G. D. Hale, O. E. Walker, J. H. Broadus and G. F. Parmalee, of Kansas. The headquarters will be at Topeka, which is also practically the field of operations for the belt company. This company proposes to run nine lines of railroad, nine lines of telegraph, nine lines of telephone, from Topeka as a center to nine of the neighboring towns and villages, and then connect these nine outposts by a belt railroad, a belt telegraph line and a belt telephone line. The estimated length of all these triple lines is 75 or 80 miles. The company expects Topeka and all these distant suburbs to grow so rapidly during the next ten years as to fill up all the country between these lines.

Ottawa, Kansas, wants to run its fire alarm wires on the poles of the telephone company. The company is objecting strenuously, and has been making, until recently, as the main ground for its objection, that it would cause electrical interference. An Ottawa reporter happened to look into the matter and found that in numerous places in Ottawa the telephone and electric light wires already run on the same poles; that in other places one pole does for the telephone, electric light and telegraph wires. Since then the telephone company has objected simply because it was "opposed" to it.

The Herrington Electric Light and Water Works, of Herrington, Dickinson county, Kansas, has been incorporated. The capital stock is named at $12,000. The directors are: J. W. Creech, M. D. Herrington, E. T. Patton, T. J. Nair, C. N. Hull, F. Hartman, C. B. Kinney, S. G. Cooke and J. H. Bedson, all of Herrington.

A. L. Ellis and others have been granted a franchise to construct electric light works in this city. At the last moment some members of the council attempted to saddle an amendment on the franchise, to the effect that the company should use no streets already utilized by telegraph, telephone, or electric light wires. As no such provision had been included in any of the electric franchises granted heretofore, and as it seemed unjust, the council voted it down.

F. A. Meade, representing the Electric Construction Company of this city, has been filling Olathe, Kan., during the past week, with burglar alarms, call bells, door bells, annunciators, etc. He is also working the town up to the point of securing an electric light system.

At St. Joseph the Missouri and Kansas Telephone Company has added a new 50 number switchboard to its exchange, which now enables them to serve 650 subscribers, and there are applications enough on file to fill the new board. The company is now having built in Chicago a 1,200 number multiple switchboard, which they expect to have working by the first of next March.

The Electric Club of St Joseph met at its rooms last Wednesday night. Only routine business was transacted. It is proposed at the next meeting to have some interesting experiments in frictional as well as dynamic electricity. All experiments will be thoroughly and lucidly explained. The telegraph instruments on the city Pony line, telephone and wires for making test experiments will be placed in the rooms during the coming week.

Salina, Kansas, has a telephone system, but few telephone subscribers. The city and those that do make use of the telephones feel that lower rates would result in a far more extensive patronage, and a mass meeting is talked of in this connection.

Bowersack's new electric lights in Lawrence, Kansas, were turned on last week, and are giving unlimited satisfaction. Eighty horse power is used in running the machinery of the plant. The works have a capacity for 40 arc lights and over 20 are already placed in business houses along the main street.

The electric light plant and the gas works at Arkansas City, Kansas, will go into operation this week. The dynamo for the electric light plant is set, the necessary buildings completed, and J. R. Strignell, an experienced electrician, is in the city, superintending the arrangement of everything. A portion of the city will be lighted all night, and another portion until midnight. The mains and pipes for the gas are all laid, and everything at the gas works is about ready for operation. The gas and electricity will be turned on at once.

J. M. Stockley, superintendent of Kansas and Missouri, for the Western Electric Light Company, is putting in a new dynamo for the Concordia, Kansas, Electric Light Company, and also a large number of incandescent lights.

Mr. J. Levin has taken charge of the Western Union office at Omaha. He is succeeded at St. Joseph, Mo., by Mr. R. Smith. His successor at Atchison, Kansas, is Chill Cochran.

W. H. McKay, the electrician in charge of the improvements being made at the Metropolitan Hotel, Springfield, Mo., has received from St. Louis an automatic fire alarm, gong and joker ratchet, which will be put up in the hotel. Once started, this bell does not stop ringing until 1,500 strokes have been sounded, and the noise made can be heard several blocks away.

From a write-up of Pine Bluff, Ark., recently published in Little Rock, it is learned that Pine Bluff is lighted by both electricity and gas, which is done by the Southwestern Light and Improvement Company, the plant of which is stocked at $80,000. There are nine arc lights along the streets. Telephone service is furnished by the Erie Telegraph and Telephone Company, which has 115 subscribers. P.

KANSAS CITY, MO., Nov. 19.

### The Geneva Non-Magnetic Watch.

In these days, when dynamos and electric motors are everywhere met with, and when they are continually finding new fields for work, the production of a watch that is utterly unaffected by the strongest magnets is an improvement well worthy of special notice. When dynamos were first introduced, many watches were magnetized, and processes and machines were invented for demagnetizing them. Finally, the custom of leaving the watch outside when entering a room containing dynamos was adopted, to prevent the annoyance due to this trouble. A cure for the whole affair, however, is found in the invention of Mr. C. A. Paillard, of Geneva, Switzerland. He has applied palladium to the manufacture of watches, using it for those parts which are usually constructed of steel. Palladium is a metal of the platinum group, but of far lower density than the latter; it is only of 11.3 sp. gr., or about 50 per cent. heavier than steel. It melts at 2,480° Fah.

Palladium is absolutely non-polarizable, and is unaffected to any noticeable extent by the presence of a magnetic field. The invention was recently tested before the National Electric Light Association. A balance wheel made of it as a substitute for steel was placed directly upon a powerful magnet without showing the slightest adhesion; another was floated upon water, and was entirely indifferent to the presence of a horseshoe magnet held close to it. An incidental advantage is that the metal is rust-proof. This makes it peculiarly valuable for use at sea. Dynamos are now being introduced on many ships, so that in one of these non-magnetic watches the two great troubles of rust and polarization are successfully provided against.

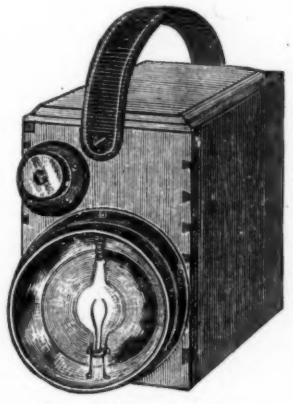
The introduction of dynamos and motors for the propulsion of street cars, for elevators, and for scores of other uses, is only a question of time. The importance of having a non-magnetic watch is increasing every day.

The Geneva Non-Magnetic Watch Company, of 177 Broadway, in this city, are well prepared to supply this want of the day, as they are the agents for Mr. Paillard's inventions, which have proved so successful, and which on their face must solve the problem. —*Scientific American.*

### Pitkin's Portable Lamp.

We are indebted to the London *Electrician* for the following description of the Pitkin portable lamp, which is illustrated herewith:

"These lamps are intended for use in coal mines and other places where explosions may be apprehended. They are the invention and manufacture of Mr. James Pitkin, of 56 Red Lion street, Clerkenwell, who has spent some years in perfecting the details of their construction. Each lamp is of the form shown in the engraving, and weighs approximately seven pounds; they are, however, easily carried by means of a strong leather handle, passing across the top from front to back. When the cells are fully charged the lamp, which is of four candle power, will burn from twelve to eighteen hours, according to the degree of incandescence at which the lamp is burned. This can be conveniently regulated by means of a switch (shown upon the front of the box), which not only turns the light on and off, but by sliding over a platenoid wire of small diameter inserts more or less resistance in the circuit. The glow lamps are of the Swan type, and are suspended from above by means of a spiral spring, secured to a metal loop, fused into the glass globe forming the lamp. They are further held in position by means of the screws passing through the case and hooked to the under side; these also form the connection between the lamp and



PITKIN'S PORTABLE LAMP.

the cells. Each cell has eight small lead plates with a projecting edge forming a trough, and projections or pins of lead at regular distances, which hold the storage material firmly to the surface of the plates. The whole arrangement is well designed and substantially made."

### New Secondary Battery.

A new type of secondary battery was employed on the electric launch recently tested by the French naval authorities at Havre. The inventor is a M. Desmazures, and the cell is constructed as follows: A cylinder of tin plate forms at once the containing vessel and a portion of the negative electrode, which is a sheet of the same material. The positive electrode is made from a plate of porous copper, obtained by subjecting the metal in a state of powder to a pressure amounting to several tons on the square inch. This plate is separated from the negative element by a partition of parchment paper supported on glass rods, the object being to prevent copper oxide reaching the negative element and causing a film of metallic copper to be deposited there. The cell is filled with a mixed solution of zincate of soda and sodium chlorate, and is then hermetically sealed. The charging is effected in the usual way, the result being a deposition of metallic zinc on the negative electrode, which is redissolved on discharging. The number of cells used at Havre was 132, which furnished a current of from 87 to 89 amperes under a difference of potential of 100 to 104 volts, and the weight per horse power per hour was about 73 pounds.

*** A telephone line is being established between Stockton and Tracy, California.

# ELECTRICAL REVIEW

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*We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.*

*We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.*

*Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.*

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill., will represent the REVIEW in the West.
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NEW YORK, NOVEMBER 26, 1887.


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It would seem that the telephone war at Rochester is to end in concessions from both sides, resulting in much better feeling on the part of everybody concerned.

A new and effective electric safe lock is announced. As electricity advances and develops, crime and criminals become more and more restricted. When the millennium comes, who dares to say that electricity will not be the all-prevailing and all-controlling energy?

The esteemed *Tribune*, of New York, in its head lines says: "The End of the Poles is in Sight." It is because one end of the poles is "in sight," that the underground question has been so thoroughly agitated. When both ends have been removed from sight then our contemporary should be happy.

The Edison Central plant people are crowding things, both inside and out, with commendable energy. There are to day not less than 140 stores, offices, etc, on the line of their underground, which are wired and waiting till the switch is turned that is to bring them from darkness into light.

One of Bridgeport's letter carriers, whose duties require him to distribute the mail over his route after dark, has adopted the novel practice of wearing an electric scarf-pin. When desirous of looking at the address of an envelope in the dark, he holds it up before his face and switches on the electricity concealed in his pocket. His scarf-pin flashes out a one-candle power electric light.

We wish somebody would invent some system of mnemotechny which would enable one to remember just when to spell names the right way, and put Thomson without a "*p*" or Simpson with a "*p*." Here's a chance for some of the ardent worshipers of Mnemosyne to offer the fleeting goddess a tribute which will be rewarded by the eternal gratitude of a world of writers. Perhaps the electrical inventor can, as often before, come to the rescue. We respectfully call on Prof. Elihu Thomson—without a *p*.

The case of the Bell Telephone Company *vs.* the Southern Telephone Company and others, at Little Rock, Arkansas, which was set for the 17th of this month, has, by consent of attorneys, been postponed thirty days to December 17th next. We understand that Casey Young, of Memphis, and Jeff. Chandler, of Washington, have been engaged as leading counsel for the Southern Company, and that they intend to make a brisk defense. An injunction in favor of the Bell Company would be the means of closing up quite a number of infringing exchanges scattered through Arkansas and the southern part of Kansas and Missouri, as well as numerous private and toll lines.

When one remembers how recently the insurance and fire departments all over the country were so bitterly fighting the electric light, it is refreshing to see the effect of education as indicated by correspondents to fire papers. One of these recently contributed a very sensible and timely paper on theater fires to one of that class of journals, in which he classifies illuminants, in the order of danger, as follows: Coal oil lamps, other oil lamps, candles, gas, arc lights, and lastly, incandescent lights, which, he says, "have the advantage that they employ a very low tension of electricity; they can be made to a great extent, portable; they are readily reflected sidewise or downwards; are simple in management; do not leak and cause explosions; do not dry the canvas, woodwork and ropes, so as to increase their inflammability; they do not fade metallic colors, as do gases produced by condensation of gas. They do not call for so much ventilation as gas, and thereby they lessen the causes of fires traveling rapidly upwards; they do not make the theater close by consuming oxygen in large quantities; they entirely do away with all that class of hazards which is the result of there being flames, as in gas lighting."

## *CHEAP GAS.*

We are taken to task by our contemporary, the *Progressive Age*, in the following manner, for our temerity in championing the cause of electric motors:

We predict that the time is not far distant when there will not be found a steam engine under ten horse power in the manufacturing shops, within reach of the generating stations of the electric light companies. Electric motors will be the source of power, and the lighting companies cannot spend their spare energies to better purpose than encouraging the rental of motors to the utmost extent. Let any company calculate the receipts on investment if their full generating capacity can be utilized thus during the greater part of the twenty-four hours, and they will find enough incentive to push the matter vigorously.—*Electrical Review.*

Sorry we can't concur in the foregoing, but the time is so near at hand when every city will be supplied with the cheap fuel—water gas—that the gas engine will become the prime motor power of the age. We agree with our contemporary, that we have very nearly reached the period when we shall dispense with the steam engine, but instead of under ten horse power, as mentioned by our contemporary, we should say 100 horse power gas engines have been made, and found capable of meeting all requirements both in economy and efficiency up to 100 horse power; and nothing stands in their way of speedy introduction but the present high price of illuminating gas. When every important city is being supplied with non-illuminating gas, the question of cheapness will be solved. The ability to manufacture this cheap gas is no longer open to question, it is an accomplished fact. Let us offer a prediction; it is this: the time is not far distant when the majority of the electric lighting plants will be run from power furnished by the gas engine.—*Progressive Age.*

This is debatable. It is to-day only under the most favorable circumstances that the gas engine can compete with the steam engine. But, for the use we predicted, *i.e.*, motive power under 10 horse power, there are too many economic questions in the way of the adoption of the gas engine, and too many arguments in favor of electric motors. First of all, the price of a gas engine of powers from 10 horse power down is now and always will be very much higher than that of an electric motor of the same power. Next, a gas engine is now and always will be more trouble to take care of than a well constructed motor, and the liability of the former to derangement will be much greater. A gas engine takes up more room than a steam engine even, while an electric motor of like power can be stowed away in any corner, or put under a bench, or stuck up on a post, and can be started by the mere shifting of a switch; and will then go ahead diligently without any asthmatic wheeze such as characterizes the performance of a gas engine. Again, here in the United States the electric lighting companies have the complete plant all ready at hand for the distribution of probably 200,000 horse power, and nothing is necessary but to cut in the trifling circuits from their mains to the motors. On the same basis, the existing mains of the gas companies would be absurdly inadequate for the purpose, while any sufficient increase in their carrying capacity would cost an amount of money such that the interest would add considerably to the price to be charged.

Aside from all this, however, we have yet to see any authority for the statement that gas engines can be successfully operated with the cheap water gas. Even in the natural-gas districts, the application of the gas engine has been found difficult, if not impracticable.

True, there will always be many places in which the gas engine will be superior as the motive power, and the superiority will be emphasized by such improvements as will permit the use of cheap gas. The gas engine has its own peculiar field, which will continually expand and give its makers all they can do to supply the demand. In these situations the electric motor cannot compete. But as a means of power distribution, we cannot see any great future for cheap fuel-gas. There is a wide enough field for the latter, in the matter of fuel alone, to satisfy the most ardent wishes of the gas companies. Out in the fuel-gas districts the consumption is enormous, the cities of Pittsburgh and Allegheny alone consuming 40,000,000 cubic feet per day. We should think, therefore, that our contemporary need feel no alarm about the progress of the electric motor interfering with the legitimate business of the gas makers.

## *OUR CHICAGO LETTER.*

(From a special correspondent of the ELECTRICAL REVIEW.)

A story told the other day at the club lunch, illustrates the earnest persistency of the average electric light solicitor. A gentleman announcing his desire to buy a plant for his manufacturing establishment—a good man was sent from a well-known agency to sell to him. The traveling man is tolerably deaf, and the purchaser could hardly get a word in, on account of this peculiarity. The t. m. was banging away for a long time, when the p. grabbed a scrap pad, wrote in huge letters "Stop!" and as soon as a silence was conquered, put both hands to his mouth, and yelled at the top of his voice:

"Don't wear yourself out so. I told you half an hour ago I would take it." And now all the boys are guessing who the chap is, so they can secure him as a traveling salesman.

Two of Chicago's club houses have suffered lightly from fires in the last few days. In both instances the mercurial alarm has notified the fire department, and prevented what in either case would have been very hard fires to fight, and very expensive ones as well, as both the Chicago and the Union League are very elaborate and costly in their decorations and furnishings. Both fires too occurred in the upper floors of the structures. And, by the way, there is every prospect that the Chicago Fire Department houses will all have electric lights, in the near future. There is no use in half doing a thing, once you get started, you know.

The bell boy who answered a ring from an upper hall in the hotel, found an elderly gentleman from the suburbs, trying to dig the plug out of the "speaking tube," so that in case of trouble he could talk to the landlord, down in the bar-room!

Major Young, of the W. E. Co., relates as to a similar status of electrical knowledge, how in the early days of push-buttons in the Briggs House, Chicago, a country guest ruined a button trying to pull the stopper out, so he could get a match out'n the box.

The Western Electric Company has just received an order for a three-hundred annunciator for the Ryan Hotel, St. Paul, Minn.

An alarm of fire at nearly two o'clock on the morning of the 17th instant, startled the sleepers at the Hotel Saratoga (European), occupying six floors at 157 and 159 Dearborn street, over the Saratoga Restaurant, next to the *Evening Journal* on the south, and across a narrow alley from the Windsor Hotel on the north. The fire was under excellent headway, and originated in the kitchen, and was climbing through the ventilator shaft when discovered. Everybody was saved. The guests probably owe their lives, at least several of them, to the Western Electric Return Guest Call and Fire Alarm, which had only been in the building a few weeks, and comprised an hundred connections. Tom McFadden, night clerk, turned the alarm on, ringing up every sleeper, and although many of these lost their entire wardrobe, save that in which they ran, they were as comfortably cared for as possible at the neighboring hotels, of which there are three or four close by. The case is not dissimilar to that at Buffalo, where a similar saving of human life was effected by an electrical alarm. The day is not far off when some legislator, having time on his hands, and with no boodle in sight or reach, will introduce a compulsory law on the subject of electrical alarms in hotels, say of over two or three stories, and make it possible to get out of that sort of fire-trap with a whole hide, even if one does leave one's garments to become a prey to the fiery element.

The *Electrical Review* (London) says that there is a gigantic scheme in the air which has a generator, the armature of which is to be 42 feet in diameter, to give 10,000 volts, and pass a current of 300 amperes along the line.

Holy (Dr.) Moses! Why, a current of

that description—3,000,000 watts—would—would—would—well! it's far easier telling what it wouldn't do in making fun for the boys than what it would do; for it probably could do just about as it was a mind to, after the original experts had abandoned it to the care of the ordinary dynamo man and the average superintendent; and when the change was made at 6 o'clock, what a glorious spectacle the switchboard would present, wouldn't it? seen from a distance, by telescope!

Pittsburgh is having a ring wrestle on the subject of owning its own electric light plant. Prof. Barrett's figures and plans are freely quoted in the discussion, and the probability is that not only Pittsburgh, but many another city will be enabled to see the economy, convenience and otherwise general satisfaction of owning, maintaining and operating its own lighting apparatus, as well as its own water-works; and the day is coming when the incandescent as well as the arc current will be furnished to the individual citizen by the municipal government as water is now distributed. And there will be fully as much growling when the quarterly or semi-annual light tax day comes round as now radiates and glows around the doors of the water department when the ominous periodical card shows up the legend: "Pay your water tax here."

Mr. J. H. Reid has just made sale of a plant of 200 Mather incandescent lamps for the Sheboygan Manufacturing Company, at the corner of Sacramento and Carroll streets, this city. The establishment is a branch of the parent company at Sheboygan, Wis. Mr. Reid has also contracted for a plant of 250 at St. Paul, Minn., for the Bohn Manufacturing Co.

Messrs. L. Stieringer and J. H. Vail, of the Edison Company, were callers at the Chicago Electric Club last week. It is gratifying to be able to state that both these gentlemen agree perfectly with sentiments expressed by the Chicago correspondent of the REVIEW relative to joints, insulation and "rig-a-gig" currents of high potentials. One likes to have one's ideas endorsed, even if they are not original.

The wiring of the Haymarket Theater by the U. S. Co. is rapidly approaching completion. The possibility of getting wires crossed in putting in multiple arc systems has been very cleverly defeated by Prof. Badt by connecting these at one end through a battery and bell, so that the wiremen can at any time determine either a cross between two or a disconnection in any one wire. The professor has so much business on hand that he can't spare the time to look at his watch. He carries a repeater, and touches a spring. He does not take time by note—he takes it by ear.

Chicago, Nov. 21, 1887.

* * Until a recent date the lightning rod agents have driven a lucrative business. All over the land, in cities and towns, and out in the country, people have relied upon lightning rods for protection. By slow degrees the people have had their eyes opened, and the progress of electrical science has made it plain that the rod is unnecessary. In some parts of the country it is still in general use, but fewer are manufactured each year, and the day will come when a lightning rod on a house will be regarded in the same light as a horseshoe over a man's door.

* * The following singular incident is said to have happened at Government Camp No. 13, near Norris Geyser Basin, Yellowstone National Park: There was a pine tree in the midst of the camp, in which twenty eight men were employed. The men had hung a scythe and a keg containing thirty-two sticks of giant powder, *alias* California nitro safety powder, on the tree. This is the most powerful explosive known, and the amount, if exploded, even in the open air, was enough to kill all the men without fail. A storm came up on the 13th of September last. The lightning struck the tree, knocked all the men senseless, but they all recovered. It melted the scythe and twisted it in all manner of shapes. It burnt up the bag containing the powder, and it all fell to the ground, but it was not exploded or impaired in the least. The tree was completely demolished.

## American Newspaper Annual for 1887.

The eighth number of N. W. Ayer & Son's carefully compiled *Newspaper Annual* is at hand. It is a volume which its publishers may well take pride in, and which will be found invaluable to all wanting a reliable authority on the many subjects upon which it treats. Its publishers are probably the best known and the most extensive newspaper advertising agents in the country, having dealings in every State and Territory, and we venture to say that these dealings are always found satisfactory both to the advertiser and the publisher. The volume contains nearly 1,200 pages, and is a model of neat workmanship, as well as careful editorial work. Published by N. W. Ayer & Son, Philadelphia.

## Prof. Cross' Lecture.

Thursday evening, Nov. 17, a large audience, including many ladies, assembled a the rooms of the Boston Electric Club to listen to an interesting lecture by Prof. Chas. R. Cross, Professor of Physics, Massachusetts Institute of Technology. The meeting was called to order by President Ridlon.

Prof. Cross illustrated each point by experiments on the numerous and elaborate pieces of apparatus from the physical laboratory of the institute.

*Experiment* 1. - *The condition of a sounding body is in vibration.* A tuning fork giving C was made to sound, and one prong was brought up to a cork ball ¾ inch in diameter and suspended by a short string. The ball was repeatedly thrown away from the prong until the fork ceased to sound

*Experiment* 2.—*All noises, as well as musical sound, possess pitch.* Eight pieces of wood of the same length, but of different thicknesses, were dropped in succession on the table and the notes of the scale were easily distinguished.

*Experiment* 3.—This was new to the club, which is run on temperance principles. The music of popping of corks was illustrated by drawing stoppers from four tubes, giving the notes *do, mi, sol, do.*

*Experiment* 4.—*Pitch depends on the number of vibrations per second.* Can be shown by drawing edge of card over milled coin. A wheel with toothed edge was set in rapid rotation, and a high note was heard when a piece of cardboard was pressed against the teeth, and the pitch grew lower as the wheel went slower.

*Experiment* 5. — *Quality of sound.* By waving a tuning fork near the ends of the prongs, the regular note or fundamental was heard. On waving near the bend, a high note was given out. The lower notes alone of organ pipes and the higher notes of the same were produced by overblowing, and finally the lower and higher notes combined when the pipes were slightly overblown.

*Experiment* 6.—That many high notes are given by stringed instruments was proven by bowing a fine piano wire and placing a feather on a point at ½ or ¼ etc., of the string, when the lower note was suppressed the higher heard, which, though usually sounding, is so drowned out by the lowest note that it cannot be noticed except by trained ears, although the presence of these higher tones alters the quality of the tones. By plucking a string at different places, some of the higher tones are brought out more strongly than the others. After successfully re-enforcing the fundamental or lowest tone of a reed so that the sound became pleasant, the lecturer explained and illustrated the action of the mouth as a resonator in strengthening the sounds of the voice so as to produce the vowels, and in a like manner made the jewsharp say "How are you?" "How do you do?"

*Experiment* 7.—A row of glass marbles was struck by a single marble. When the marble at the other end was driven off, those between not being affected in the slightest. In the same way, air transmits sound

*Experiment* 8.—The circuit of the electro magnet driving tuning fork, and opened and closed by the fork itself, was connected with an induction coil. In the secondary circuit of the same was placed a Bell receiver. The tone from the receiver was totally unlike that given by the fork, thus going to prove that a make and break circuit cannot be used in transmitting speech.

## The Rochester Telephone Trouble.

A conference was held in the mayor's office last week, says the Rochester *Herald*, between Col. D. B. Parker, representing the Bell Telephone Company, of Boston, and the executive committee of the People's Telephone Association, of Rochester, with a view to settle the difficulty existing between the former users here and the Bell Company of Buffalo. Dr. Jonas Jones presided at the meeting, and Frank J. Amsden was secretary. Other members of the People's Association present were: John Van Voorhis, J. W. Gillis, Henry Likly, J. W. Goss, F. H. Vick, Stephen Remington, C. A. Phillips, H. F. Huntington, George Weldon, L. P. Ross, Nathaniel Foote and William Hale representing M. W. Cooke.

The chairman stated that an informal conference had been had with Colonel Parker, and as the result of that interview the committee had drawn up the following propositions for submission to him as representing the company:

First—The Bell Telephone Company of Buffalo shall make such arrangements with the city authorities as shall be satisfactory—similar to those existing in Boston as stated by Colonel Parker.

Second—A flat rate, which shall be satisfactory to the People's Telephone committee, shall be established.

Third—All subscribers who cease to use the telephone in November, 1886, but whose contracts extended beyond that time, shall be released from liability.

Fourth—Those who paid in advance of Nov. 20, 1886, and who did not use the telephone after that date, shall be allowed the unexpired time on their new leases, provided they elect before January 1, 1888.

Fifth—All litigation pending between the company and the citizens of Rochester and vicinity shall be discontinued, and the company shall pay all expenses of the litigation, including fees of counsel.

Sixth—A person selected by the executive committee of the People's Telephone Association shall be made a director of the Buffalo company, and he shall be managing director of the office and business at Rochester. He must be a resident of Rochester.

Seventh—The company shall give a proper guaranty that the rates fixed upon as aforesaid shall not be raised for five years.

Eighth—The wires to be placed underground as soon as practicable, in the business streets.

Col. Parker took up the various propositions and in so many words, says the Rochester paper, accepted most of them. He was unable to say that the company would agree to the rates proposed by the citizens, which are $45 per year for dwellings, $50 for professional offices, and $60 for business places, extra telephones on the same line to be at half price. Colonel Parker left for home to submit the propositions to his company.

The rates which Colonel Parker desired the association to accept were $4 per month for residences, $5 for professional offices, and $6 for business places.

## The Electric Club Discussion.

In its review of the last paper read before the Electric Club, New York, at its last meeting, by Dr. Leonard Waldo, the Philadelphia *Ledger* says:

"A very interesting discussion took place at a recent meeting of the New York Electric Club as to what constitutes an electrician. The general sentiment of the members who spoke on the subject appeared to be, that there were two classes of men who are entitled to the name. One was the class skilled in physical science and in engineering, to whom could be referred as experts questions of engineering connected with the construction of new works. The second class embraces the workman who has charge of the construction and maintenance of electrical plants. These two classes require very different training, although each should have a knowledge of the other's specialties. The question of the utility of the present method of educating electricians aroused considerable difference of opinion. In many colleges there is a special course connected with the schools of engineering for educating electrical engineers. It was generally agreed that these courses might be very much improved. The Thomson Houston Electric Lighting Company, it was stated, have an industrial school connected with their works, where qualified workmen were given the basis of an education in the principles of electrical science. This was very generally approved as a useful method of educating a class of electrical workmen. While the discussion did not settle the question as to who is or who is not an electrician, it brought out some very useful ideas about what an electrician ought to be."

## ELECTRIC CLUB NOTES.

The very tasty annunciator and call bell work, the latter being of gold, was all presented to the club by Messrs. Hazazer & Stanley.

Col. Wm. C. Church, recently elected, is the well-known editor of the *Army and Navy Journal*, and a prominent member of the Century and Press Clubs.

The announcement having been sent to the members that all was in readiness for the books intended for the library, several very interesting collections have been received.

The secretary has finally succeeded in securing nearly all the photographs of the managers of the club, and hopes soon to be able to frame them for hanging in the club house.

The safe of the Electric Club will have an electric lock on which the only possible means of working the combination and unlocking the safe, and thereby securing a glimpse of the immense sums of money contained therein, will be through the medium of the electric current.

A number of the members of the club propose honoring Lecturer Charles Dutton with their presence in his audience on the occasion of his delivery of his lecture: "What is the Telephone?" before an Orange, N. J., audience, December 7th. It is needless to remark that the good points made by the lecturer will be promptly and vigorously applauded.

The house committee is now engaged in deliberating over the code of rules that should prevail among such a learned, energetic and progressive body as the Electric Club. The members of the house committee are M. W. Goodyear, George B. Coggeshall, Cyrus O. Baker, jr., H. A. Reed and Charles Dutton; and if their friends should notice their preoccupied air, they will readily understand the cause of it.

Among the first contributions to the new club house was a series of photographic groups of several of the later clam-bakes given by the American Electrical Works, and presented to the club with the compliments of President Eugene F. Phillips. The groups are neatly framed, and will always be an object of interest to visitors, as they comprise the familiar countenances of so many electrical men.

At the last meeting of the managers, 21 new members were elected, including Capt. Henry Erben, U. S. N.; Lieut. E. L. Zalinski, U. S. A.; Capt. W. S. Cowles, U. S. N.; Col. Wm. C. Church, Chas. J. Kintner, of New York; Samuel M. Bryan, of Washington, D. C.; Thos. B. Kerr, J. D. Nicholson and W. J. McElroy, of Pittsburgh; L. C. Weir, of Cincinnati; W. N. Estabrook, of Elmira, and others.

The interest taken in the new club house by non-resident members is very great, as is evidenced by letters received from them by resident members. It is probable that every member will be present on the occasion of the opening. As there are over 330 members, and a number of applicants to be acted upon at the next board meeting, held prior to the opening, the club house will be filled to overflowing on that occasion.

The very striking glass doors and transom with the word "Electric" on it, have attracted a great deal of attention from the residents in the select part of the city in which the club house is located. One envious soul is reported to have said that those doors gave him the "jim-jams," but as he is not an electrical personage and his senses are not imbued with the high and lofty purposes of the electrician, the remark falls to the ground without disturbing the equilibrium of the general admiration possessed for those doors by the members who have seen them.

It is proposed, if it can be arranged, to have one of Mr. Edison's improved phonographs at the club on the opening night, and every member in attendance will be expected to speak a few words into its sympathetic and delicate ear for a permanent record of the ideas that prevailed on that evening, and the names of the speakers. This will be an interesting event, and as the "phonogram" will remain at the club house the voice of each member can be heard from it at any future time, whether the owner of the voice is one or a thousand or more miles away.

## Telephonic News

*** Wealth maketh many friends, but the poor is separated from his neighbor.

*** Professor Gray's telautograph is said to be attracting much attention in Paris.

*** A number of leading telephone men are taking an interest in the use of platinum plugs for telephone switchboard work.

*** There are three electric roads being constructed in Pittsburgh, the Fisher (of Detroit), the Bently-Knight and the Daft.

*** The Missouri & Kansas Telephone Company's last quarterly statement makes a most excellent showing for that well-managed company.

*** The improvements in the new Consolidated Exchange on Cortlandt street, New York, will prevent its being opened until about January 1st.

*** The American Acoustic Telephone Company, Boston, is reported to have found a ready market for—its stock. This should satisfy the promotors.

*** A stern-wheel boat named "Telephone" is reported to have made the fastest time on record on the Pacific recently. She is properly named, for the telephone annihilates time and space—and sometimes paralyzes the user.

*** Mr. W. A. Vail, superintendent of exchanges of the Metropolitan Telephone and Telegraph Company, is exacting very prompt attention to calls of subscribers from his operators in the eleven exchanges in this city, and giving his whole time to the advancement of rapid service. The company has now about seven thousand subscribers.

*** For some reason, the United States Supreme Court seems disposed to delay in telephone matters. Its decision in the great cases argued last winter has been awaited every week since it met this fall, but Monday after Monday passes without its appearing It may come next Monday, however. Meanwhile, the case of the United States against the Bell Telephone Company, decided against the United States in Boston, has been appealed to the Supreme Court, and the motion made by Solicitor-General Jenks to advance it on the docket for an early hearing, has been pending for two weeks. Possibly a decision on this, which is expected to be favorable, may be made next Monday.

*** An important meeting was held at the Stock Exchange last week, between the Committee of Arrangements of the Stock Exchange and the representatives of all the telegraph and leading cable companies. On behalf of the latter there were present Charles R. Tincker, General Superintendent of the Western Union; A. S. Brown, General Superintendent of the Mutual Union; A. B Chandler, President and General Manager of the Postal, and George G. Ward, General Manager of the Commercial Cable Company. The object of the meeting was to discuss a grievance which the telegraph companies claim to have against the Stock Exchange. The complaint is that the Exchange is exacting from the companies too heavy a rent for the privilege of doing business in the Exchange. The companies have combined to protest against these charges, which they say are exorbitant, and threaten to remove their instruments from the Stock Exchange unless the cause of complaint is abated. They now pay to the Exchange between $7,000 and $8,000 as a fixed rental, and in addition to this, they pay a toll for the collection and delivery of messages, which amounts yearly to a large sum. The matter was fully discussed but no conclusion was reached, and after long arguments, it was determined to lay the subject before the Governing Committee of the Exchange at its next meeting.

*** The Assembly Committee investigating the subject of telephone charges, with a view of determining what legislation is necessary toward making them more uniform, at its session in New York took up the Hudson River Telephone Company, which controls the Newburgh lines. Among the facts elicited were: that the company was organized April 27, 1883, at which time the franchise was received from the American Bell Telephone Company, of Boston. There are 1 097 stations operated, covering in New York the counties of Warren, Saratoga, Washington, Fulton, Montgomery, Schoharie, Schenectady, Albany, Rensselaer (except exchange at Troy), Greene, Columbia, Ulster, Dutchess, Sullivan, Orange and Putnam, with the counties of Wayne and Pike in Pennsylvania, Sussex in New Jersey, and those parts of Westchester and Richmond outside the 33 miles radius of the New York City Hall. The total cost of this plant was $653.667.44. The committee, from all we can learn, were not impressed with the fact that the rates charged were too high in this territory, but quite the reverse.

*** Prof. Dorn, in the *Electrotech. Zeits.* for October, proposes a form of earth plate which should be valuable to all observers of earth currents, if, as is claimed for it, it reduces polarization to a minimum. It consists of a flat open box, made of wood or cement, and coated inside with asphalt. This is placed at the bottom of a hole in the ground. An amalgamated zinc plate lies flat in the box, and an insulated wire leads from it to the surface. Care must, of course, be taken that the joint is well covered, so that nothing but zinc is in contact with soil. An earthenware pipe stands on the zinc and rises to the surface. The box is then tightly rammed with clay, soaked with concentrated zinc sulphate solution, and the hole filled up. Solid sulphate is dropped down the tube and solution poured after it. A little fresh sulphate from time to time will keep the plate in order.

### Iron or Wooden Poles.

WHICH SHALL BE USED BY THE ELECTRIC LIGHTING COMPANIES?

Owing to the new contracts for electric lighting in the upper part of the city the important question whether the poles to be put up by the contracting parties shall be made of wood or of iron interests not only the contractors, but the property owners and the public generally.

While the subway scheme contemplates putting all wires underground at some time in the future it is not thought desirable to delay the use of the electric light until the subway should be available. The question of poles is one for immediate consideration.

The Board of Electrical Control appointed a committee consisting of Mr. Hess and Chief Engineer H. S. Kearny to hear what the parties interested had to say. The electric lighting companies were, of course, fully represented.

Mr. Park Benjamin, consulting electrician of the Board of Electrical Control, who had attended the committee meeting and heard all the arguments, ventures the following opinion on the subject.

"The point at issue is one of great importance, not only to the companies, but to the people. While eventually the main circuit wires that will be strung on these poles must go underground, it is probable that some of the poles will have to be retained to carry the local distribution wires from the trunk lines to the dwellings and stores. It is not an entirely temporary expedient that is involved.

"The impressions that I gained from listening to the discussion before the committee may be summed up thus: In favor of iron poles it is urged that they are smaller than the wooden poles and are less obstructive to the streets; that they are less unsightly; that they are less liable to injury; that they will serve to carry up through their hollow interiors the local service wires from the subway mains; that they last longer, and that, being good conductors of electricity, they will, in case of lightning strokes, conduct the lightning to the ground and save the destruction of the lighting system.

"Against iron poles it is said that they cost more than wooden poles, and that as they furnish good ground connections they may pass the current to the ground through the body of a lineman, killing or crippling him.

"Wooden poles are cheaper than iron, and when perfectly dry they insulate the wires from the ground. But against the cheapness of their first cost—said to be $7 each, as compared with $30 for an iron pole—must be set their rapidity of decay, making the effective life of a wooden pole only about one-fifth of that of an iron pole. Other objections are the danger of their falling on account of rotting at the base, the frequent pulling up of the street when they are replaced, their unsightliness and the greater space they occupy in the streets. They cannot be used to carry local distribution wires from the subway mains, because if a hole be drilled through their centers it makes a place for the retention of moisture, which hastens the decay and makes them good conductors to the ground. If the wires be carried upon the outside with a half-round covering, the clumsiness and cost of the poles are increased, while the warping or buckling of the pole is sure to uncover the wires and possibly risk the life of any incautious pedestrian who may lean against them.

"The chief drawback to the iron pole is, in short, its first cost, and the chief advantage of a wooden pole is its insulating capacity when perfectly dry. But here comes in a new condition:—The moment damp or wet weather comes on, the pole becomes a ready conductor to the earth, entirely vitiating its chief good quality; or, if it loses its paint and gets a saturated streak down its whole length, it becomes a permanently good conductor, and therefore as dangerous to linemen as an iron pole.

"It is admitted by all that if the lamp is cut out of circuit during manipulation, there is no danger to the linemen, whichever pole is used, and that proper insulation of the conductors is an equally safe protection against accidents. Both of these conditions can readily be obtained.

"The question is simply to choose between a wooden pole, known to be dangerous to linemen under certain constantly occurring conditions of weather, though safe under other conditions, and an iron pole, known to be dangerous all the time, unless proper safety devices are provided. The public desires the least ugly, least obstructive, most permanent and most useful pole, provided safety be secured to pedestrians and linemen. Whatever will make the wooden pole safe in wet weather will make the iron pole safe all the time, and whatever device is used must be used constantly. Rubber gloves, boots and coats are invariably discarded by the men. The interests of the public, therefore, are all in favor of the iron pole.

"The companies oppose the iron pole simply on the objection of its first cost. They have taken short time contracts and they object to putting so much money into poles. But I do not think this is sound reasoning, even from their own standpoint. The law requires that a company taking a territory previously lighted by another, shall purchase its predecessor's poles at first cost. That relieves them of the risk incident to the short contract. The greater length of life in the iron pole brings its permanent cost down to that of the wooden pole, even on the basis of $30 and $7 respectively. But there is another economical side to this pole question which the companies have apparently disregarded, and that is the danger of being struck by lightning. There is little danger down town, where there are other large masses of metal more conspicuous; but out on the boulevards and in the upper part of the city generally, there is every possibility that the poles or wires will be struck. An iron pole would carry the flash to the ground at once, without injury to the rest of the plant, but with wooden poles the enormous current would travel along the wires to the dynamos, and they would be burned up. No system of lightning arresters will protect them."—*N. Y. Herald, Nov.* 13, '87.

*** Steubenville, Ohio, is to have an electric railway. Mr. Wilbur F. Goodrich will have charge of the surveys and location.

### Telegraphic Communication Between England and France.

As most telegraph people know, the concessions to the Submarine Telegraph Company, in virtue of which it has enjoyed a monopoly of the telegraphic communication between England and France for a period of thirty-five years, will expire in 1889, and the question of its renewal is at the present time being actively discussed by Chambers of Commerce in various parts of the country. The London Chamber has asked for the views of provincial chambers on this subject, with the result that the whole of the answers received approve of the abolition of the monopoly. In the opinion of the London Chamber there is no reason in favor of the continuance of the monopoly, as the company has obtained a fair remuneration for its enterprise, and the competition in trade, of which so much is heard, necessitates that communication with the Continent should be made at the lowest cost.

It appears that the Submarine Company, founded in the year 1851, had the financial astuteness to divide itself into two bodies, apparently with a view to hide the results of its working; but if the two dividends are added together, we find that the average division of the profits on the two capitals has been between thirty-two and twenty-seven per cent. A company which, for thirty-five years, has been paying dividends of this kind, has certainly given a very fair return to its shareholders, and cannot reasonably claim any continuance of its monopoly. No doubt in 1852—we believe the Submarine Company was one of the first cable companies formed—there was considerable risk in connection with such an undertaking, and it was only reasonable that the subscription of its capital should be accompanied by some security. But the case is now altered, and the laying of cables has become a matter of commercial enterprise.

The British Chamber of Commerce in Paris does not merely ask for the abolition of the monopoly. Its president, Mr. John G. Pilter, has recently submitted to the Postmaster General the following resolution, adopted by the Board after a full discussion:—"That the Submarine Telegraph Company, having enjoyed the exclusive right of carrying telegrams between England and France, for the full period specified in its charter, during which period it has paid very large dividends at the expense of the telegraphing public, this Chamber is of opinion that the concession, shortly to expire, should not be renewed, as there does not appear to be any reason for the intervention of a private company; and that the telegraphic communication should rest wholly with the telegraphic systems of the two countries."

The practical view of the matter taken by the Paris Chamber is, according to a circular now before us, that since the existence of telegraph cables between England and Ireland, and England and the Channel Islands, is not considered a sufficient reason for any increase in the charge for telegrams between those places beyond the ordinary inland rate, the very small distance to be traversed by cables between England and France ought not to involve any increase in the price over the sum of the inland rates of the two countries, that is to say, one penny per word (of course with a word limit); and that were it not for the intervention of a private company such a tariff would be practicable.

We confess that we like this proposal. Certainly the British Chamber of Commerce in Paris does not advocate half measures. It does not timidly ask for some reduction in the rate, but boldly urges that the Governments concerned should have the communication in their own hands. That such a change would be to the public advantage cannot be doubted. Telegraphically speaking, there is no reason why Paris should not be as near to London as is Dublin and Cork, and we have no doubt that if the reform asked for by the Paris Chamber of Commerce were carried out, such would speedily be the case. Unquestionably one of the first steps taken to this end would be the substitution of the "Wheatstone" fast-speed system for the "Hughes" apparatus now employed by the Submarine Company.

Although the corporation whose future existence is at stake numbers many powerful men among its directors, we trust that Mr. Raikes, who is now earnestly considering this matter, will deal with it in such a way as to satisfy the wishes of the community at large. —*The Telegraphist.*

### The Postal Telegraph—How the System Works in England.

The renewed discussion of the subject of postal telegraphy will call attention to the Government system which has been established in Great Britain, and which cannot be said to be any longer an experiment. Several congressmen are searching for information as to the practical working of that system, and they have not been wholly successful in their search. The report of the Postmaster-General for Great Britain for the current fiscal year has just been received in Washington, and contains much that will, undoubtedly, prove of interest to those who intend to investigate this question during the coming session of Congress. The passage which relates to the relations of the telegraph to the Government is as follows:

"The first complete financial year during which the reduced rates for inland telegrams were in operation expired on the 31st of March, and it is interesting to note the effect upon the number of messages and upon the revenue. Separating the ordinary inland messages sent in that period from railway, press, official and foreign telegrams, which are not affected by the reduced rate, and of which there were over 10,000,000, it appears that the number of messages dispatched was 40,137,175 in 1886–7, compared with a total of 30,087,869 in 1885–6, and that the revenue produced was £1.354,879, as compared with £1,227,606 in the previous year, showing a growth of over ten millions, or 33 per cent., in the number of messages, and over £77,000, or 6 per cent., in the revenue. This comparison, however, is not strictly fair, as the year 1885–6 continued six months at the one-shilling rate. A more accurate comparison may be afforded by taking the last six months of 1885–6 and the corresponding six months of 1886–7. This shows an increase of 2,333,745 in the number of messages, or 14 per cent., and of £75,670 in amount, or 13 per cent. The London local messages alone show an increase of 50 per cent., the total number being about 3,800,000.

"Notwithstanding the rapid and satisfactory growth of the telegraph business, the expenses of the service far exceeds the receipts, and the deficit, after including the interest payable for the capital borrowed, amounted to £469,840. The following table shows the deficit for each year for seven years:

| | |
|---|---|
| 1880–1 | £984 |
| 1881–2 | 112,525 |
| 1882–3 | 142,224 |
| 1883–4 | 346,114 |
| 1884–5 | 362,767 |
| 1885–6 | 371,554 |
| 1886–7 | 469,840 |

"New telegraph offices have been opened at 232 post-offices throughout the United Kingdom, and, including 1,542 railway station offices, there are now 6,514 public telegraph offices. Copper wire of the weight of 150 pounds per mile has been used with marked success, and by this means a rate of 450 words a minute has been attained, as compared to a rate of 350 words a minute on iron wire, the highest previously recorded on any line. The use of copper wire is likely to be advantageous as enabling a greater amount of work to be got out of the plant, and as possibly avoiding the necessity of costly relay stations."

The telegraphs were purchased by a loan of a capital sum of £10,880.671, of which the annual interest charge is £326,471.

There are other interesting facts in this report about the British postal service. The use of electric bells in the "railway traveling post-offices," for the purpose of indicating when the mail-bag exchanging apparatus is in working position, has been introduced with great advantage, and the system will soon be extended to all the "traveling post-office." The parcels post system has been greatly extended, and is "much used for the transmission of fruits and flowers. Upwards of 14,000 parcels containing primroses reached London on the 18th and 19th of April." The Post-office Savings Banks commenced operations September 16, 1861, a quarter of a century ago. On the 31st of December, 1862, the end of the first complete year, the total amount, inclusive of interest, standing to the credit of depositors was £1,698,221. On the 31st of December last it was £50,874,838—a result which proves the value attached by the public to this institution. It will be seen from this statement that, even in a country of so narrow geographical limits as England, the Government telegraph is conducted at a loss.

### Utilizing Wave Power.

After many accidents and trials the wave power motor, so long talked of, has at last been finished, and proved a success. The construction of this machine or apparatus, which was begun in July, 1886, was at the time considered a hare-brained scheme, but the projectors stuck to their plan, and seem now to be in a fair way of success. Great difficulty was experienced at first in getting the materials to withstand the force of rocks thrown against them by the waves, and the pipes which conduct the water up the bluff were broken and carried away no less than fourteen times. When the schooner Parallel went ashore and her cargo of dynamite exploded, the motor was completely wrecked. A mass of rock, weighing 600 tons, was thrown from the cliff and fell across the chasm over which the motor was suspended, blocking it up to such an extent that nearly three months were consumed in blasting out the débris. Soon afterward another mass of stone, weighing 150 tons, fell, and had to be removed. The motor, designed and built by E. T. Steen, is a very simple contrivance, and still is capable of exerting a great power.

Across a chasm in the rocks just north of Parallel Point a bridge of heavy timbers was built. Suspended from this is a huge fan or paddle of oak timbers, with the spreading portion downward. This is fastened to the bridge by immense hinges, which allow it, when in operation, to swing back and forward a distance of thirty-six feet as the waves strike it. The handle or upper portion of the fan is connected with a solid plunger pump twelve inches in diameter and having a stroke of nine to twelve feet. This pump, in turn, is connected with a suction pipe running out into deep water. The fan is so rigged that it can be drawn up out of reach of the waves when not in use. When a wave comes in, the fan is thrown forward and forces the air out of the pump barrel in which the plunger works. On the wave receding the fan is carried seaward and the plunger is drawn out, causing a vacuum, and causes a quick rush of water into the suction pipe. The force with which the water is drawn up is sufficient to raise it to an elevation of 350 feet above tide level.

Should this motor prove as successful as the projectors seem confident it will, several others will be built in the same neighborhood, and an immense reservoir built on the hill to contain the water.

This one motor, with its twelve-inch plunger, is capable of raising 12,000 cubic feet of water 350 feet high in every twenty-four hours. The uses to which the water will be put are valuable. A thirty-six-inch pipe will be conducted to the city, and water will be supplied to all branches of industry where machinery is used. Bathing houses will also be supplied with salt water, and sewers flushed when it is necessary.

The first work performed will be begun in about ten days, and an eight-inch pipe is now being laid for the purpose.

The last mentioned pipe is for Adolph Sutro, and is to be utilized in sluicing away a large amount of drifting sand from the heights just back of the aquarium. This work is rendered necessary to prevent the sand from washing back on the beach and retarding the work.

The immense fan of the motor generates a large amount of energy not used in working the pump, and when everything is in shape electric dynamos will be erected to utilize this energy for heating purposes and the like. —*San Francisco Call.*

.... The Daft people are endeavoring to put in an electric road at Oswego, N. Y.

### New Composition for Leclanche Batteries

M.M. Bender & Francken use the following:

| | |
|---|---|
| Peroxide of manganese | 40 parts. |
| Graphite | 44 " |
| Tar | 9 " |
| Sulphur | 0.6 " |
| Water | 6.4 " |

These substances are to be well powdered, mixed, moulded and compressed. The mass is then dried and placed in a furnace the temperature of which is 350° C.

This temperature, lower than that at which the tar decomposes, is sufficient to drive off all the volatile matters. Then the sulphur, acting on the less volatile constituents of the tar, transforms a part of them into gaseous products which escape. The remainder acts as in the vulcanization of caoutchouc, and gives a solid product.

.... Upon the telegraph line between Bale and Lucerne M. Hagerbach has recently carried out some experiments to determine the rate of propagation of the current. His method is extremely beautiful and ingenious, and is based upon the well-known experiment of Lissajous, in which a ray of light is reflected successively from the prongs of two tuning forks which vibrate in planes at right angles. If the forks are precisely in tune, then the resultant motion of the reflected ray describes upon the screen either a right line, an ellipse, or a circle, according to the relative phase of the vibrations of the two forks. In M Hagerbach's experiment the vibration of the forks is maintained by an electro-magnet make-and-break in the usual manner. The electro-magnets are placed in circuit with a battery, and a switch is arranged so that the telegraph line can be thrown into circuit between the two magnet coils. The line being first cut out of circuit, it is found that the spot of light describes a narrow ellipse, showing that the phase of the second tuning fork is slightly behind that of the first, owing to the retardation in the coils of the magnet. But as soon as the whole length of the line is thrown into circuit the ellipse widens out, and thus visibly demonstrates the increase of retardation. From measurements of the figures described, the time of retardation can be calculated. M. Hagerbach made the experiments over various lengths of line, but the actual values obtained are not of much value, owing to the very complex nature of the problem. The retardation varies directly with the square of the resistance, but it depends also upon the permittance, inductance, and impedance of the circuit, and of these terms no record is given. The results showed, however, considerable departure from the simple ratios of the squares of the resistance of different lengths of the line. A full account of the experiments will be found in *Wiedemann's Annalen.*

.... Electrical literature is in great demand. The interest in electrical invention and progress increases constantly. More inquiries for books on electricity come to this office than at any time in the past.

.... The Utica (N. Y.) Electric and Gas Company recently recorded a mortgage for $150,000 on its property and franchise in favor of the Central Trust Company, of New York city, for the purpose of obtaining funds wherewith to complete the plant extensions now in progress.

.... The new and mysterious language of the electrician would have no terrors for the editor of the *Sun.* Hear him: "The omni-sciolistical princox who daubs dullness over the vast editorial page of the Brooklyn *Eagle* should get him to his Latin accidence. In time he may discover that Pallid Death is not masculine in Latin."

.... The *London Electrical Review* says that it appears that there are at least half a dozen projects now on foot for the supply of electric lighting by transformers from central stations. In one gigantic scheme we hear of a projected dynamo with an armature 42 feet (!) in diameter, which is to give 10,000 volts and pass a current along the line of 300 amperes.

## TELEGRAPHIC

.... The Metropolitan Telephone Company has arranged to put in a new telephone exchange at Eighteenth street and Broadway. The most perfect switchboard apparatus will be used and all detail carried out with a view to the exclusive use of metallic circuits. This exchange will be the center point of the underground system of the company.

.... Nearly two hundred telegraphers of both sexes, employed by the Baltimore and Ohio Telegraph Company, in the operating room at Broadway and Canal street, were notified by Manager J. W. McLaren, on Tuesday, that their services would not be required after the last day of this month. Mr. McLaren is reported as saying that the Western Union Company was going to close up the office at Canal street.

.... A telegram from the *Times* correspondent in Brussels appeared in Monday's ssue of that journal, and was to the following effect: "Successful experiments in optical telegraphy, by means of the luminous captive balloon, have been made at the camp of military engineers, near Antwerp. Mr. Bruce, assisted by Mr. Queenston, prepared the apparatus, and Captain Mahauden directed the operations. The military authorities present were satisfied with the results, which are very creditable to the Electrical Power Storage Company."

.... Remarking on the disuse of lightning rods, a correspondent writes us as follows: "A few years since every business house and private residence was bristling with rods and points, while the lightning rod agent was the most intolerable nuisance that ever imposed upon the public. If Dr. Benjamin Franklin, who discovered the identity of lightning and then invented the lightning rod, were now alive, he would throw up his hands in horror. It was formerly thought that the rod was a genuine protection to houses, and for years people labored under this delusion. But the fact is that the rod is not a necessity, and is oftentimes a source of positive danger. A residence or business house is just about as safe in a storm without a rod as with one, and the people of this generation have learned this fact. An invention that is not useful or practical is not tolerated nowadays, and so the lightning rod has well-nigh become extinct. In past years its manufacture was a great industry, but other electrical machines and appliances, of recent birth and of greater value, have supplanted the rod and driven it into general disuse and obscurity. Nor can I say that I am sorry to see the lightning rod go, for it humbugged the American people nearly 100 years ago."

.... Telegraph operators are interested in a new telegraph apparatus which may decrease the demand for skilled labor. One of these machines has just been finished by two well-known electrical machine makers of Philadelphia, Mr. J. Elliott Shaw and Mr. John Geary. It consists of an attachment in the form of a printer, so arranged that the message is printed simultaneously at both ends, and done on paper of regular size, instead of on long strips, as at present in vogue. This part enables the operator to see at a glance whether or not the message is being properly transmitted. The work of expert operators is dispensed with by the introduction of a key-board, the same as in use on type-writers, and operated in a similar manner. By this means all knowledge required is to know how to manipulate this key-board, and the machinery can be attached to both ends of the wire either at long or short distances, while the attachment of loops will bring in unison as many points as it is desirable to reach. Mr. Shaw has spent months in the tedious work of arranging the delicate and intricate machinery, and is disposed to think that the time is not far distant when the sound and printing telegraph operators will go out of existence.

## ELECTRICAL AND SCIENTIFIC

* * Washington's Belt Line Railway Company has decided to adopt the electric motor system in use in Philadelphia, using the Electrical Accumulator Company's storage batteries.

* * A practical experiment with electricity is about to be made in Nevada City. The machinery in George G. Allen's foundry is to be run by electricity for a week or two, in order to give mining men an opportunity of being convinced that such power can successfully be utilized as motive power, and at one half the cost of steam.

* * M. Garel has recently called attention to a simple method (though we believe the same thing has been previously described) for obtaining stencils on paper, similar to those given by the Edison pen. A fine paper is to be used, resting on a block of carbon, and the writing is done with a lead pencil, the lead of which is connected with one of the poles of a small induction coil, and the block of carbon with the other pole. The spark that passes leaves in the paper, along the line of writing, a multitude of fine holes, through which ink may be pressed with a roller, in ordinary ways.—*Revue Scientifique.*

* * The Russian Minister of Ways of Communication has appointed a special commission to select the best system of electric lighting for railway carriages. This is the result of a decision recently arrived at to render the adoption of the electric light compulsory upon the principal railway companies for all passenger trains. The experiments will be conducted on the Nicolaeff Railway, and are not expected to last more than a month. The South Russian Railway Company, it should be noted, has already adopted the electric light for all fast trains running between Odessa and Kieff; while it has been used in the special imperia trains for some time past.

* * A new process has lately been invented for the singeing of goods by electricity instead of gas, as has been used herefore. Both sides of the goods are singed at the same time, the same as is done by a gas singeing machine. The trouble has always been in singeing goods by getting a quality of gas that was pure enough to do this work with. In fact, it is almost impossible at the present time to get a pure quality of gas. It is said the only trouble with the electric machine that has lately been brought out to do this work is in regulating the flame (so called) so that it shall be uniform at all times, but it is thought this objection can be entirely overcome.

* * The *Horological Journal* sums up the restriction created by the Merchandise Marks Amendment Act as follows: It appears that, pending authoritative construction of the Act, the practice of the trade will be: 1. A watch entirely English in an English case, if named with other than an English address, to have "English make" or some similar words engraved thereon. 2. An English watch in a foreign case, whether it have an English address or not, to bear the words "English make." 3. Foreign watches wholly of one nationality, in a case of the same origin, if named with an English address, to have either the name of the country of origin added, or the name of that country with the word "make" or "manufacture" added. 4. A foreign watch in an English case, whether named with an English address or not, to have engraved the name of the country of origin, and "make" or "manufacture" added. 5. Composite watches, whatever kind of case is used, must apparently rely on a certificate, unless two or three words engraved on the watch will exactly describe its origin. Present stocks, where they do not conform to the above marking, to be sold under certificates.

* * The National Society of Hamburg, Germany, has offered a prize of 500 marks for the best essay on the subject of calming the sea by the use of oil. An exhaustive description of experiments of the effect of oil made up to the present time is required; also a criticism of the arrangements used so far, and especially complete directions for its use by large steamers and sailing vessels, as well as small vessels—pilot, fishing, and life-saving boats—besides directions for the use of oil at sea and near the coast. The essays are to be written in English or German.

* * According to Mr. André, in the *Colliery Guardian*, of London, recent experiments with carbonite have shown it to be a very safe explosive in an atmosphere laden with gas and coal dust. Some convincing tests were made last week in the experimental gallery, constructed for the purpose at the factory at Schlebusch, in the presence of a number of eminent mining engineers. The trials were made against common blasting-powder and dynamite. The charge was embedded in very dry dust warmed up to a temperature of 86 degrees Fahr., and fired by electricity. Air was blown into the gallery to stir up the dust before the shot was fired. The first charge consisted of 100 grammes of common blasting powder. A violent dust explosion followed, flame being projected from the end of the gallery. Next four cartridges of dynamite, weighing 320 grammes, were fired under the same conditions, a partial ignition of the dust being occasioned thereby. Again, a charge of black powder, this time weighing 130 grammes, was fired with the same result as in the first case. After this, seven cartridges, of carbonite, weighing 510 grammes, were fired under precisely the same conditions as in the former cases. The dust was not ignited. Another seven cartridges of carbonite, weighing 490 grammes, exploded under the same conditions as regards the dust, but, with fire-damp added to the atmosphere, completed the series. The explosion did not ignite the gas.

### Electric Currents in Large Conductors.

Prof. Stefan, of Vienna has been making studies upon variable electrical currents in conductors of large diameter. Some of his results are curious. For example, in an iron wire of 4 mm. diameter, when the current makes 250 complete vibrations per second, the current density is 25 times as great at the surface as at the axis. For a double number of vibrations (50°), the amplitude at the surface is 6 times as great as on the axis. In he first case the difference of phase is one-half the period, and one-half in the second case, so that then the current at the surface is going in a direction opposite to that at an axis of the wire. These differences are very much smaller in non-magnetic wires; thus, in a copper wire of 4 mm. diameter for 500 vibrations of the current, the amplitude at the surface is only 14% greater than at the axis, instead of 6 times, as above. On the other hand, a copper wire 5 times greater in diameter, presents the same phenomena as the iron wire. The resistance of the wire increases because the internal layers participate less actively in conveying the current, and even convey the electricity in an opposite direction to that of the outer layers. The expenditure of energy in a wire traversed by a variable current, is always greater than would be calculated according to the ordinary rules. Thus, for 250 or 500 vibrations, the apparent increase of resistance in an iron wire 4 mm. in diameter is 48% or 100%, respectively.

The circumstances which increase the resistance of wire contribute equally to diminish its self-induction. The non-uniform distribution of the density of the current is not always accompanied with a weakening of the current strength. Just the opposite is found with currents having a greater number of variations. In consequence of the inequality of the density of the current, the intensity is much greater than if the distribution had been uniform.

—— In electric lighting, litigation is very promising. The attorney who doesn't understand electric lighting will soon lose caste.

### Schanschieff's Solution for Primary Batteries.

A solution of a salt of mercury as an exciting agent in connection with galvanic batteries is often used, especially when there is a desire or a necessity to employ large quantities, and it becomes economically advisable to recover the mercury. Recently Mr. Schanschieff has obtained a patent for a "novel saline preparation," which is produced from metallic mercury and sulphuric acid. It is, when free from impurities, a white salt freely soluble in water, to such an extent that 2lb. of metallic mercury are held in solution in a gallon of water. Three pounds of sulphuric acid of specific gravity 1.846 are added to 2lb. of metallic mercury, boiling until the metal is dissolved, and maintaining the heat until the excess of acid is evaporated. When cold, one gallon of water is added, which, however, dissolves a part only, precipitation of basic sulphate of mercury taking place The solid residue is separated and boiled with sulphuric acid as before, in the proportion of two parts of the residue to three parts of acid. By boiling the residue is dissolved, and by continuing the heat the excess of acid is evaporated, the resulting mass when cold being added to the original solution, dissolving as much as the solution will take up and separating the residue. After three or four repetitions the whole is dissolved in the original gallon of water. The density of the liquid will then be 1.435 Beaumé, and the quantity about five quarts. Finally the liquid is evaporated by heat until the salt is deposited in a solid state. It is raked out as it falls, and is packed in closely stoppered bottles, in which it may be kept for an indefinite time When liquid is required for use in a battery, one gallon of water is used to 5lb. of the salt, which dissolves perfectly, leaving no residue, or if there are impurities which render the liquid turbid, it may be filtered through paper. The solution is then ready for use in a battery with zinc and carbon elements. In another process metallic mercury is dissolved in sulphuric acid and the excess of acid evaporated. When cold the salt is dissolved in three times its weight of water, partial solution only, accompanied by precipitation, taking place. The patentee then adds strong sulphuric acid little by little, and finally drop by drop, with constant agitation, the solution becoming gradually more and more complete until finally it is perceived that the drop of sulphuric acid as it falls into the liquid produces a precipitate; the process is then stopped and the solution cooled and filtered. It is then evaporated, as already described, and yields in a dry state the novel saline material.

### The Electric Light in New York.

A recent number of the *City Record* gives an abstract of the proceedings of the Gas Commission of New York, whose duty it is to arrange for the lighting of the streets, public buildings, etc. The larger part of the report relates to the different bids of the electric light companies for lighting the streets by electricity, and the final disposition of the matter.

In the first place, the form of contract has been prepared with great care. It does not contain those loosely drawn specifications so characteristic of such documents. The third specification of the contract relates to "luminious intensity." "Each lamp must give a light equivalent to that of not less than one thousand standard sperm candles," etc. The photometric measurements are to be made on a Bunsen photometer, and the candle power is to be determined at an angle of 40 degrees from the horizontal. After each observation the electric lamp is to be revolved 90 degrees about its vertical axis and another observation taken, and so on until ten observations have been made, the average of all being taken in determining the candle power. A gas, oil, or other lamp of at least 20 candle power, the value of which has been determined by comparison with candles, is to be used as a standard light. The measurements are to be made with a globe removed. Each lamp must be operated at not less than 475 watts in the arc. Provision is also made for the testing of the lamps; and in case the illuminating power is less than 1,000 candles such lamps are to be paid for only in proportion to the light furnished.

The awards made by the Gas Commission do not state the exact number of lights required, inasmuch as this can better be determined when they are in position. At the same time the following are about the number of lights awarded to each company, with the prices per lamp per night:

U. S. Illuminating Co.—About 325 lamps, at 50 cents; 38 lamps at 40 cents; 15 lamps, at 24 cents.

Brush Electric Illuminating Co.—About 450 lamps, at 25 cents; 17 lamps, at 40 cents.

East River Electric Light Co.—About 191 lamps, at 39 cents; 271 lamps, at 19.9 cents.

Mt. Morris Electric Light Co.—About 15 lamps, at 40 cents.

Harlem Lighting Co.—About 116 lamps, at 24 cents; 12 lamps, at 50 cents; 7 lamps, at 60 cents.

American Electric Mfg. Co.—About 93 lamps, at 32 cents.

North New York Lighting Co.—About 36 lamps, at 40 cents.

### Edison and the Ranch Girl.

It is related that, while out West several years ago, Edison and a party met a ranchman whose daughter was a victim of fainting spells. Edison declared if he could get some old cells and a coil from the operator he could provide the necessary current. So he rigged up a rude kind of battery and went down with French to operate on the girl the next time she had one of her attacks. One of the whims of the girl was, when emerging from her cataleptic state, to grasp whatever was nearest her, so as Edison happened to be there with the sponge on the back of her neck treating her to a dose of electricity, she took fast hold of him. The father saw this, and supposed the girl to be in love with the electrician. He and the mother talked the matter over, and came to the conclusion that the electrical appliance was a sort of infernal machine or philter by which this stranger was winning the affections of the girl.

"See here, stranger," said the man to Edison, whose deafness is well known, "if you mean business, all right." Edison bowed very gravely, hearing not a word. "Cure the girl up and you can marry her. There's fifty head o' cattle you can run off and sell if you want to, as you look mighty seedy yourself. I don't suppose you're worth a dime, air you?" Edison, seeming to understand that a negative was required, shook his head at this.

"I thought so; just what I told my woman. But that gal's the apple o' my eye, and if she hankers arter ye she's goin' to have ye; and some of them men, who seem to rather like ye if you air a poor cuss, can witness the thing and bring down a justice."

Again Edison bowed.

Dr. French, who tells the story, then thought it was about time an end was put to the business, and hurried the telephone man off, and the rest of the party explained the situation to the ranchman, telling him that Edison was deaf and a lunatic, and knew absolutely nothing except a little about electricity, which he could show the mother how to apply to the girl in case of a renewal of the attack, which, however, seemed doubtful, as the disease had so quickly succumbed to the strong measures used.

They all chipped in and made up a purse for the girl, Edison heading the list with a big sum. The girl married the next year, and is a buxom young woman.

### Electricity Not Dutiable.

Secretary Fairchild has informed the collector of customs at Eastport, Me., in reply to his inquiry on the subject, that electricity, being an invisible, subtle agent or power, possessing no substance as a merchantable commodity, would not be liable for duty when brought into Calais by wire.

—— Berlin Falls, N. H., is to be lighted by a 30 arc light plant of the Waterhouse system. The light will be burning by Dec. 1st.

### Intrinsic Brilliancy of Some Lights.

The intrinsic brilliancy of a source of light is the quotient of its photometric power by its surface. It depends essentially upon the temperature of the luminous body. M. D. Monnier has given the following figures for some lights :

| | | | | | |
|---|---|---|---|---|---|
| Candle flame..... | 0 06 | can. | per | sq. | cm. |
| Argand burner..... | 0.3 | " | " | " | " |
| Siemens burner..... | 0.6 | " | " | " | " |
| Glow lamp..... | 30 | " | " | " | " |
| Arc lamp..... | 480 | " | " | " | " |

—— Mr. Hadwin Houghton, Hunter's Point, L. I., has contracted for a twenty-five light electric plant with the Tucker Electrical Company. The system will be put in at once.

—— Taft, Weeden & Co., woolen manufacturers, Providence, R. I., were so well pleased with the Waterhouse arc system that they ordered a Waterhouse incandescent plant, which has just been delivered.

—— Slater Cotton Company, Pawtucket, R. I., have ordered 30 arc lights, Waterhouse system. and the E. Jencks Manufacturing Company, of the same place, have placed their order for 83 Waterhouse arc lights.

—— Baltimore is to have five hundred 2,000 c. p. lights of the Waterhouse system. Mr. Robert R. Zell and Mr. Wm. R Pope have been instrumental in forming the Waterhouse Electric Company of Baltimore, and a first-class station, under their supervision, we are informed, is to be constructed.

—— The council of Conshohocken, Pa., has passed to third reading a resolution granting the Westinghouse Electric Company the right to run poles and wires in the streets of the city. An ordinance giving the Conshohocken Gas Company the same privilege was read, and on motion of Mr. Lindsay, was laid on the table.

—— The Wilmington, Del., electric light company, is increasing its plant. The standard link belt of Chas. A. Schieren & Co., New York, has been ordered. Benedict & Burnham. the wire manufacturers, have ordered the link belting for their Waterbury establishment. Thirty-two feet of the link belting has been ordered by the American Illuminating Company, at Hornellsville, N. Y.

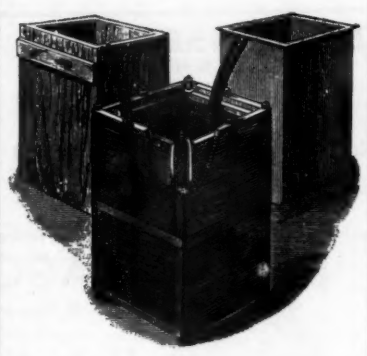
—— The Electric Development Co., San Francisco, Cal., has been incorporated for the purpose of manufacturing, dealing and operating all kinds of electrical apparatus, machinery, appliances or systems for any purpose to which electricity may be applied. The directors are Geo. S. Ladd, J. C. Henderson, James Armstrong, Jno. I. Sabin, W. G. Oliver and W. H. Armstrong. The capital is $60,000.

—— Articles of incorporation of the Electrical Energy Co. were recorded in the County Clerk's office at Newark last week. The capital stock is $100,000, and it is divided into 1,000 shares Mr. Henry M. Paine, of Newark, holds 994 shares. The other incorporators are : Ira L. Willets, of Bloomfield ; John Bradly, of Newark ; Erastus Hayes, Alfred T. Sinker, Willard R. Roberts, and Louis C. Whiton, of New York. The business of the company is to be carried on in Newark, and it will be the manufacture of electrical motors and the appliance of electrical energy to every purpose for which electricity can be used.

—— The bond for $10,000 tendered by the American Electric Manufacturing Company for the faithful performance of its contract for street lighting, has been accepted by the advisory committee of the town of Hyde Park, Mass., and the contract, which is deemed very advantageous to the town, has been signed by a majority of the selectmen. By the terms of the contract, the lights, seventy-five in number, are to be in position on or before January 1, 1888. S. C. Putnam, David Perkins. G. L. Stocking, B. C. Vose, F. W. Tewksbury, J. H. Tuckerman and J. D. McAvoy were appointed a committee to decide upon the location of the lights in the several sections of the town.

### Elieson's New Secondary Battery.

Mr. Elieson's reasons for designing a new form of accumulator are based upon his recent experiences in tramcar propulsion. He has found that in practical working the present forms of batteries, including his own, on the principle of alternate, positive and negative plates, are not likely to prove successful for any length of time for the purposes of electric locomotion. It appears that the chances of buckling and short circuiting, due to mechanical and electrical action, have not yet been eliminated, and that the continuous vibration and jolting on the track will distort the best mechanical arrangement in a comparatively short time. Up to the present, no one has discovered a more suitable metal than lead, and this, owing to its weight, adds greatly to the distorting influences. Mr. Elieson, therefore, found it absolutely necessary to set to work and design a new form of cell, which should secure a maximum of active surface with a minimum of weight, and, at the same time, ensure a durabilty which does not seem obtainable under the known methods of construction. It will be seen from the drawing which accompanies



Elieson's New Secondary Battery.

this description, that the battery of Mr. Elieson consists of but two electrodes, although for special purposes these may be increased. The cast-lead frame of each is in the shape of a hollow square about 9 inches deep ; the outer one being 6 inches, and the inner 4½ inches square. Each side is filled up with longitudinal strips of lead foil separated, except in those points through which the bolts referred to below pass, as in the inventor's previous form of plate, by asbestos paper. The skeleton frame at each corner, and in the center of each side, is furnished with a tapped bolt, and when the lead foil is all built up, a movable top clamp, also of cast lead, is placed over all and the whole mass tightened up as desired by screw nuts of ebonite.

The two electrodes are placed one inside the other in a leaden box, being insulated from one another by thick india-rubber bands stretched from top to bottom at each corner, and insulated from the bottom of the box by a cross-piece of wood; the whole is enclosed in a teak case.

Mr. Elieson believes that the type of cell which he has submitted to us will fulfill all that is required for the purpose of electrical propulsion, but it is rash to prophesy with regard to the future of cells constructed for this special purpose. The weight of the two elements is 36 pounds, and the surface exposed is estimated at 26 000 square inches. We hope that the inventor's belief that this form of cell marks another forward step in the production of a practically perfect accumulator for tramcars will be realized.

—— It is strange that while the British papers are noting the general failure of electric light installations throughout the kingdom, the successes in the same direction that are won on the continent are largely won by British engineering firms. The electric light has seen its darkest days in Great Britain, and it will not be long before the gas companies over there will see that the laws are so altered that they may take in the twin system as rapidly as the companies on this side are doing.

—— Red Bluff, Cal., is to be lighted by electricity. The Sierra Lumber Company will furnish the power and will use six lights.

—— There is great complaint in St. Louis of the poor quality of the gas. But this does not interfere with the size of the gas bills.

—— A monster petition was presented to the Buffalo council last week, asking that the electric light be substituted for gas on another thoroughfare.

—— The total appropriation for city lighting at Rochester is $115,000 for the year. This sum is divided between the Brush, the Edison, and the Rochester companies.

—— There are 108 electric arc lights in use by the city of Washington, D. C. Congress appropriated $20,000 additional for this purpose, and the present number exhausts the appropriation.

—— The Salina, Kansas, Electric Light and Power Company has been incorporated. The capital stock amounts to $25,000. The directors are : William E. Geis, Joseph Suebert, George Kreuger, W. F. Gilbert, John Buchi and J. F. Burrows, of Salina, and Henry Lehman, of Wichita.

—— The Oakland, Cal., Electric Light and Motor Company has been incorporated. The directors or trustees are : James Gamble, H. H. Watson, W. W. Blow, Thomas W. Corder and Andrew Baird. The capital stock is $200,000, of which amount each of the stockholders or directors have paid $1,000, or $5,000 altogether. It is stated that this new corporation will secure the plant of the Pacific Coast Electrical Construction Company.

—— At a recent meeting of the Buffalo Electrical Society, Mr. F. P. Jones delivered a lecture on "Carbon and its Uses." He explained its advantages in connection with electricity and the various ways in which it is utilized in telegraphy. He described it as a purely elementary substance and one of the most important in nature, and also showed its relation to the animal and vegetable world.

—— A correspondent who predicts that the day is not far distant when horses upon our streets must disappear, gives the following figures to show the length of the several electric railways : Appleton, Wis., 4½ miles; Asbury Park, N. J., 4 miles; Binghamton, N. Y., 5½ miles; Denver, Col., 4 miles; Detroit, Mich., 5 miles ; Lima, Ohio, 6½ miles ; Los Angeles, Cal., 5 miles ; Montgomery, Ala., 13 miles ; Port Huron, Mich, 5 miles ; Scranton, Pa., 4½ miles; Wichita, Kan., 4 miles. In addition to the above there is a much larger list, with which I shall not burden you, of electric street car lines which are being rapidly pushed to completion.

—— For some nights past, remarks a Washington exchange, unusual numbers of small birds have been observed flying in a dazed manner around the electric lights which illuminate the streets. At 4 o'clock yesterday morning on F street were a dozen cats. Overhead the air was filled with sparrows fluttering around the lights. Many flew against the glass globes and fell stunned. Then the cats would scramble for them. Occasionally when a bird alighted on the ground to rest, a cat would stalk it successfully. Along Seventh street, where the lights are close together, the air was alive with birds, and the street was thronged with cats. The street, ordinarily quiet, was noisy with the cries and fluttering of the birds. The sparrows—not the unpopular English species, but the small and pretty wood sparrows—were evidently migrating by night, and had been diverted by the glare of the lights. When dawn came they went their way. Another curious incident was afforded by a flock of wild geese. Their path was directly down Seventh street, and the brilliant glare served to entangle them. They circled around and around, making their loud characteristic cries for some time before they got straightened out. Policemen in various parts of the city reported yesterday that large numbers of wild geese and ducks flew over the city on Tuesday night.

## ELECTRIC LIGHT NEWS

—— The Tucker Electrical Mfg. Company, New York, have contracted for an electric plant for Jacob Lorillard's brick works at Keyport, N. J. One hundred incandescent lamps will be used, of the Mather system.

—— Mr. Le Roy Payne, of Chicago, has ordered, through Mr. C. F. Dunderdale, 151 La Salle street, Chicago, agent for the Waterhouse system, 20 arc lights for his famous horses' home. Mr. Payne can now exercise the trotters at any time within the twenty-four hours.

—— The Trenton House, at Trenton, N. J., has contracted with the Tucker Electrical Company, New York, for a complete annunciator system. B. F. Romaine has contracted with the same company to do all the electrical work in seven new houses on West 97th street.

—— The Newark Schuyler Electric Light Company have made a great success of the Waterhouse system in Newark, N. J. Since January, this year, they have placed 200 Waterhouse 2,000 c. p. lights, in the face of the hottest kind of competition, and have just ordered another 100 light plant, to be delivered before January 1st.

—— The Waterhouse Electric and Manufacturing Company have been making large shipments of electric light apparatus to California. The Fresno Gas Company, Fresno, California, says : "In the six months' test we have subjected the plant we have had the best opportunity of judging of the merits of the Waterhouse system of arc lighting and do not hesitate to recommend it."

—— Fredericton, New Brunswick, is rejoicing at the introduction of the electric light. They have a 66 light Waterhouse plant, and the Fredericton *Capital* says : "The light was turned on at 7.30 o'clock, Oct. 29th, and when it is borne in mind that the contract for the station was awarded only five weeks previously, and that all the work was consequently hurriedly done, the exhibition on Saturday night is worthy of being pronounced very satisfactory. The company deserve much credit for their push and exterprise."

—— The Waterhouse system, running on an Otto gas engine, receives favorable comment from the Washington *Gazette*, of Washington, Ind., as follows: "The electric street light is a pronounced success, and is the subject of favorable comment from all the traveling men who come to this city. Several have expressed themselves to the *Gazette*, and they all stated that the Washington light is the best street light they have seen. It is steadier, clearer and brighter than the old style street lights. The reporter and Mr. Lord walked north to Walnut street, two squares, and then on past Walnut to the little creek that flows from the fair ground. On the banks of the creek the rays from the 8½ ampere lamp, 800 feet away, enabled one to read coarse print, while still many yards away the light could be seen reflected against the embankment of the E. & I. Railway."

—— The gas works at Omaha, Neb., blew up a few days ago. The scenes in the city were, outside of the districts of electric light, like those of the primitive days Not a street lamp was lighted. The gas in the halls and theaters flickered and burned uncertainly after nine o'clock at night. The kerosene stores and oil stores had a great run for lamps and coal oil, and some kept open yesterday. At the hotels candles set in bottles were carried around by the bell boys and passed current for standard illumination. The Paxton, which has its public rooms and a part of the guests' rooms lighted by its own electric plant, was in high luck. Churches, theaters and club rooms were dark at night, and in the lower part of the city no gas burned. On the bills where the gas remained in the pipes, it was available, though not steady. The loss to the gas company, which is estimated at $15,000 to $20,000, is covered by insurance.

# ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING NOV. 15, 1887.

373,043 Signal for telephone instruments; John M. Baker, Paola, Kan.

373,046 Electrical railway; Benson Bidwell, Philadelphia, Pa., assignor of one-half to Charles F. Bidwell, Indianapolis, Ind.

373,051 Electric temperature regulator; Lucien F. Easton, La Crosse, Wis.

373,064 Galvanic battery; Carl Gassner, jr., Mentz, Germany.

373,073 Alarm; William G. Joerke, New York, N. Y.

373,088 Therapeutic battery; Miles A. Morehouse, Johnsburg, N. Y.

373,102 Electric bell; 373,103 373,104 Electric valve controller; George M. Sternberg, U. S. Army.

373,108 Electric motor; Elihu Thomson, Lynn, Mass., assignor to the Thomson-Houston Electric Company, of Connecticut.

373,145 Dynamo electric machine and electromotor; William Main, Brooklyn, N. Y.

373,146 Electromotor and dynamo electric machine; William Main, Brooklyn, assignor to the River and Rail Electric Light Company, New York, N. Y.

373,152 Telegraph key; Alonzo Oakes, Taylor, Wis.

373,160 Electric train signal apparatus; Joseph C. Tiffany and John R. DeMier, Las Cruces, assignors, by direct and mesne assignments, to the De Mier Electric Train Signal Company, Albuquerque, New Mexico.

373,207 Mail box indicator; Jacob P. Tirrell, Somerville, assignor to John Z. Rogers, Winchester, Mass.

373,211 Magnetic separator; Jonas Wenstrom Orebro, Sweden.

373,289 Sectional draw rod for placing electric wires in underground conduits; William H. Hart Brooklyn, N. Y., assignor to William H. Johnstone Philadelphia, Pa.

373,334 Battery jar; Charles A. Brown, Portland, Me.

373,369 Automatic regulator for dynamo electric machines; Charles D. Jenney, Indianapolis, Ind.

373,387 Railway telegraphy; Granville T. Woods, Cincinnati, Ohio, assignor to the Woods Electric Company, same place.

373,394 Electric cable; Amos E. Dolbear, Somerville, assignor of one-half to Francis M. Holmes, Boston, Mass.

373,399 Electrode for forming clots in varicose veins; Jonathan R. Hamilton, Minneapolis, Minn., assignor of one-half to Lyman R. Palmer, same place.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BUSINESS NOTICE.

Carbon Manufacturing Machinery and two dynamos for sale at auction on NOVEMBER 26TH, 1887, at 10 A. M. at the entrance of County Court House, Cleveland, Ohio. Can be seen, part at Wallace & Son's Manufactory, Ansonia, Ct., and part on application to Whitehead, Gallagher & Richards, 745 Broad Street, Newark, N. J.

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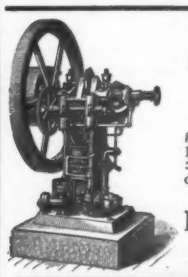
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W. J. Buckley, Mgr. Ft. Wayne Jenny El. Light Co.
Thomson-Houston Electric Light, Herbert Wadsworth, Manager Western Office
Brush Electric Co., Alex. Kempt, Special Agent.
Excelsior Electric Co., C. J. Reilly, Western Mgr.
Sperry Electric Light Motor & Car Brake Co., 201 Royal Insurance Building.
J. H. Reid, General Manager of the Mather Electric Light Co., Chicago.
Wm. H. Purdey, Comm. of Public Works, Chicago.
John Mab, Chief Engin'r of Board of Trade, Chic.
C. J. Meimes, Gen'l Sup't Thomson-Houston Light, Omaha, Neb.
J. A. Corbey, St. Joe Electric Light and Power Co., St. Joe, Mo.
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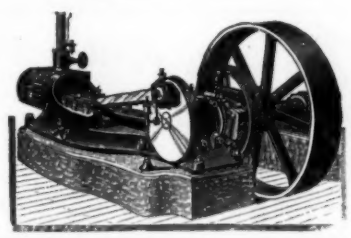

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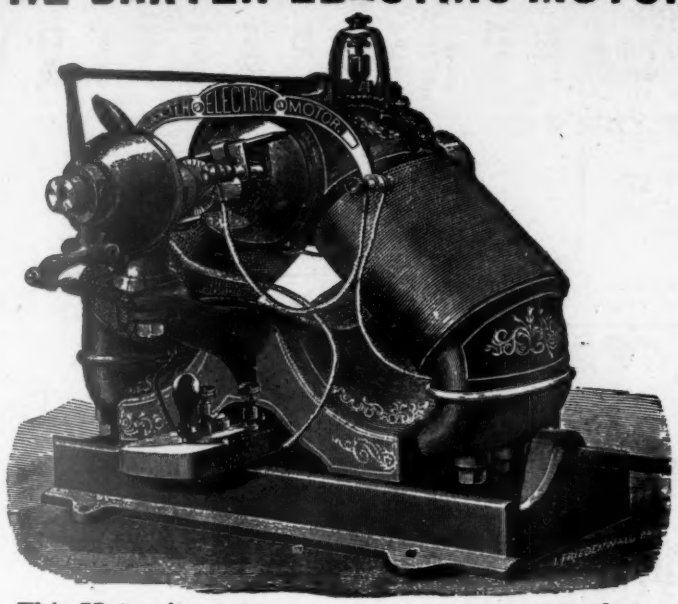


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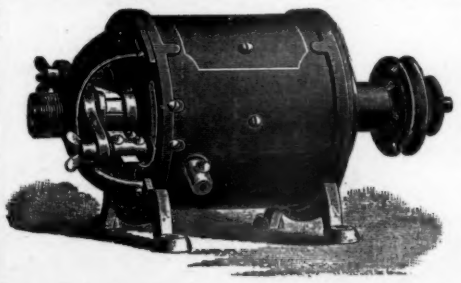

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Fig.259

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Fig.260

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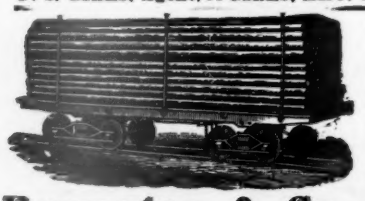

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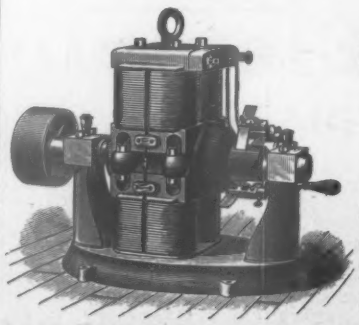

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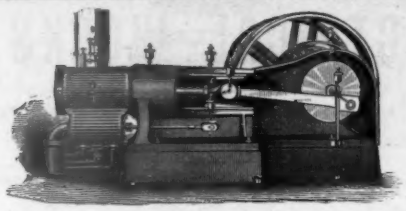

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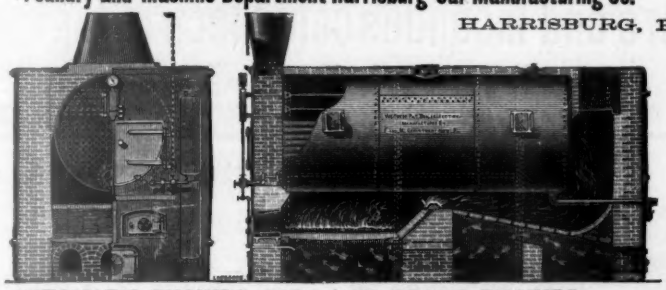

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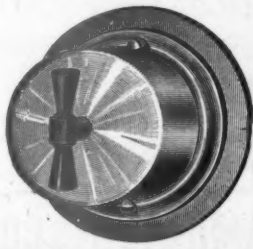

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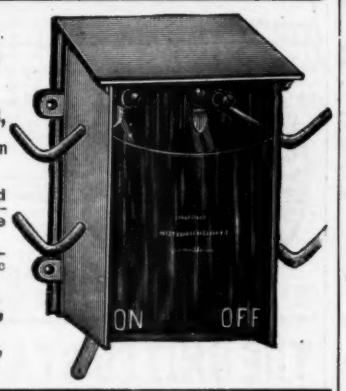


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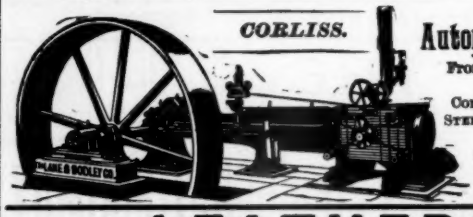


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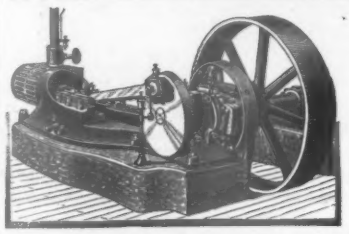

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Said letters patent cover all known forms of storage batteries wherein the electrodes comprise a support, combined or associated with a mechanically mixed or applied active material as well as other forms of storage batteries.

The making, using or selling of such storage batteries infringes the rights secured to this company by the above patents, and not only manufacturers and dealers, but individual users of such storage batteries, not furnished by this company, or its licensees, are responsible for such infringement, and all the consequences thereof, and liable to suit therefor.

We have brought suit in the Circuit Court of the United States for the Southern District of New York against the Julien Electric Company for infringing our patents by the manufacture, use and sale of storage batteries having electrodes consisting of a support combined or associated with a mechanically applied active material.

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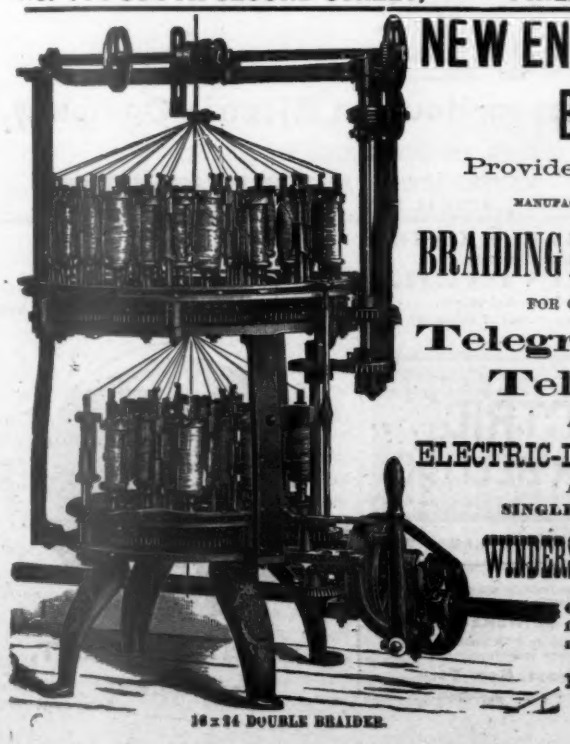

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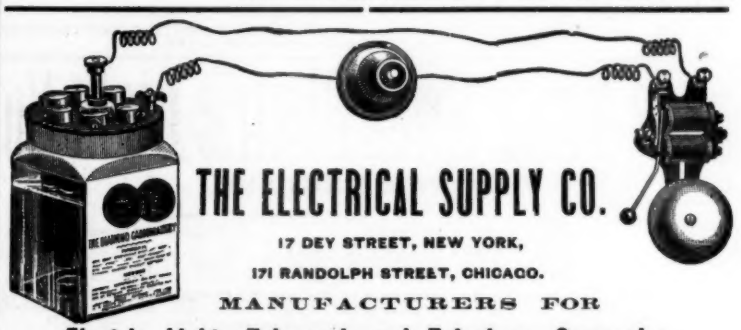

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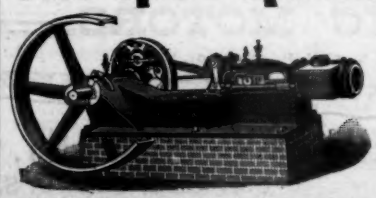

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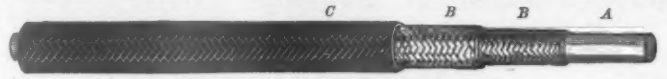


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